TORREYA

A Bi-Monthly Journal of Botanical Notes and News

John Torrey 1796–1873

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
GEORGE T. HASTINGS

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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A Tertiary Ephedra

R. P. Wodehouse

Ramis aphyllis, articulatis, geminatis oppositis ad articulos. Internodiis striatis; iis ramulorum adaxialium quam eis abaxialium brevioribus.

The present specimen is a thin carbonaceous residue, representing a curved section of stem. It consists of a single node and part of each of the adjoining internodes, and from the node arise two branchlets lying in the plane of curvature of the main stem. The first internode of the branchlet on the concave side is considerably shorter than that of the branchlet on the convex side. A third exceedingly slender branchlet lies above and to one side of the main part of the specimen, but is not organically connected with it.

The rock bearing the fossil was broken apart in such a way that the specimen is split into halves. Fig. 1 is a photograph of the more distinct half.

OCCURRENCE: Miocene Florissant beds of Colorado. Collected by K. Vreeland, 1901. Deposited in the museum of the New York Botanical Garden.

A similar species, *Ephedra nudicaulis* Saporta, has been described from the Miocene flora of Aix-en-Provence (Saporta 1889), but it differs from the present specimen in having scaly nodes. *Ephedra johniana* Goepp. and Berendt, in the Tertiary flora of Bernstein, is described from a twig bearing pistillate cones (Goeppert and Menge 1883). Consisting of different parts of the plant, a satisfactory comparison with the present specimen is not possible, but it does not seem to be the same species. *Ephedra sotzkiana* Ung. (Unger 1870), *E. mengeana* Goepp. (Goeppert and Menge 1883) and *Ephedrites sotzkianus* Ung. (Unger 1850, Heer 1885) bear little or no resem-

blance to the present specimen. It, therefore, appears to represent a hitherto undescribed species.

By comparison with living species, this specimen was found to match most closely *Ephedra nevadensis* S. Wats. In many specimens of this species the branchlets are prevailingly in pairs and opposite at the nodes (Fig. 2), though in other specimens they are whorled. The branches in leaving the parent stem generally bend sharply upwards, in which case the branchlets which the branches bear on their concave or adaxial side have shorter basal internodes than those on the abaxial side, closely approximating the condition found in the fossil speci-

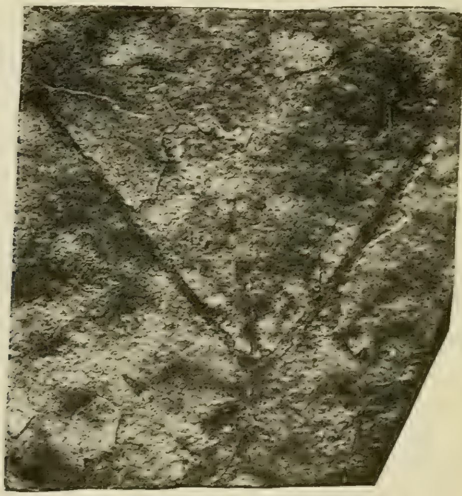

Fig. 1. Photograph of one half of the specimen of *Ephedra miocenica* n. sp. ×.8.

men. The fossil is therefore presumably the basal section of probably a secondary or tertiary branchlet. This habit of branching, with the basal internodes of opposite branches of different lengths, is not common among living species of *Ephedra* and, among the available specimens, was encountered only in *E. nevadensis*.

It appears likely that the slender contorted branchlet in the fossil, though not now in organic connection with the rest of the plant, was originally a part of it, probably arising from a lower node. Similar slender branchlets occur in several living

species of *Ephedra*, originating from the same nodes with and between the larger branchlets.

So far as I have been able to ascertain the only other record of fossil *Ephedra* in the Tertiary of America is that of the pollen species, *Ephedra cocenipites* which was described by the writer (Wodehouse 1933) and found to be abundantly represented in the Green River oil shales. In view of the fact that the Florissant flora is a Miocene derivative of the Eocene Green River flora and is characterized by many similar species, the finding of

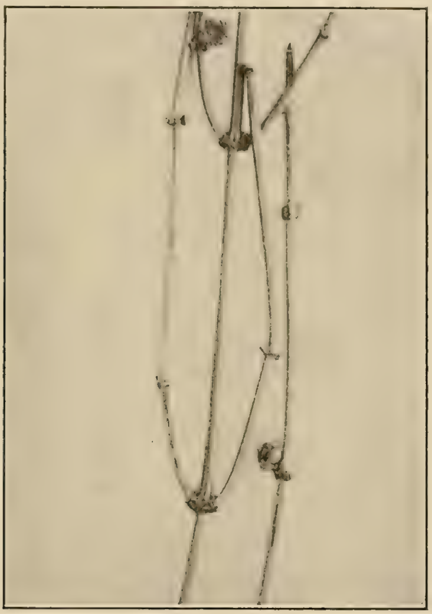

Fig. 2. Photograph of herbarium specimen of *Ephedra nevadensis* S. Wats. at same magnification as Fig. 1.

this fossil is of exceptional interest; and it rather certainly establishes the existence of *Ephedra* in America during the Tertiary period.

I am greatly indebted to the authorities of the New York Botanical Garden for the opportunity to study this specimen, and especially to the late Dr. Hollick for directing my attention to it. He stated that he believed that the specimen would prove

to be *Ephedra*, though he was not prepared to say so definitely at that time.

THE ARLINGTON CHEMICAL CO., YONKERS, N. Y.

References

Goeppert, H. R. and Menge. 1883. Die Flora des Bernsteins und ihre Beziehungen zur der Tertiärformation. Pt. 1, p. 47, pl. 16, figs. 243–245, 247, 247a.

Heer, Oswald. 1855. Flora Tertiaria Helvetiae. Vol. 1, p. 60, pl. 22, fig. 2.

Saporta, G. 1889. Dernières adjonctions à la flore fossile d'Aix-en-Provence. P. 57. pl. 5, figs. 1–8.

Unger, F. 1850. Die fossile Flora von Sotzka. Densk der Math.-naturwiss. Classe der Kaiserlichen Akad. der Wiss. **2:** 159.

——— 1870. Geologie der europäischen Waldbäume. Pt. 2, p. 133, pl. 3, fig. 21.

Wodehouse. 1933. Tertiary Pollen—II. The oil shales of the Green River formation. Bull. Torrey Club. **60:** 495.

A supplementary list of tautonyms and miscellaneous nomenclatural notes

HAROLD N. MOLDENKE

Some time ago I published in the Bulletin of the Torrey Botanical Club [59: 139–156. 1932] a brief discussion of tautonyms and a list of 228 of these bizarre "double binomials." Since the publication of this article my attention has been called to thirteen more which were not included in my first enumeration. These are as follows:

ACETOSELLA ACETOSELLA (L.) Small, Man. SE. Fl. 446. 1933.
=*Acetosella vulgaris* Fourr., Ann. Soc. Linn. Lyon, N. S. **17**: 145. 1869.

AMARELLA AMARELLA (L.) Cockerell, Am. Nat. **40**: 871. 1906.
=*Amarella quinquefida* Gilib. Fl. Lithuan. **1**: 36. 1781.

BALSAMORHIZA BALSAMORHIZA (Hook.) Heller, Cat. N. Am. Pl. 7 & 132. 1898.[1]
=*Balsamorhiza Hookeri* Nutt., Trans. Am. Phil. Soc. II, **7**: 349. 1841.

BLECHNUM BLECHNUM (L.) Millsp. ex Small, Man. SE. Fl. 1229. 1933. [error for *Blechum Blechum* (L.) Millsp.].

CHORDARIA CHORDARIA (Harv.) M. A. Howe, Bull. Torrey Club **51**: 136. 1924.
=*Chordaria Cladosiphon* Kütz. Tab. Phyc. **9**: 2, *pl. 2, fig. 11.* 1859.

LUPINUS LUPINUS Rydb., Bull. Torrey Club **40**: 44–45. 1913.
=*Lupinus utahensis* Moldenke [see below].

PEPO PEPO (L.) Britton in Small, Man. SE. Fl. 1287, hyponym. 1933.
=*Pepo vulgaris* Moench, Meth. 653. 1794.

SORDARIA SORDARIA (Fries) Ces. & De Not. Comment. Critt. Ital. **4**: 225. 1863.
=*Rosellinia Sordaria* (Fries) Rehm, Ber. Natur. Ver. Augsburg **26**: 49. 1881.

SPHAEROCARPUS SPHAEROCARPUS (Dicks.) M. A. Howe, Mem. Torrey Club **7**: 66. 1899.[2]

[1] This combination is spelled *Balsamorrhiza Balsamorrhiza* by Rydberg in Mem. N. Y. Bot. Gard. **1**: 417. 1900.

[2] This combination is spelled *Sphaerocarpos Sphaerocarpos* by Haynes in Bull. Torrey Club **37**: 220. 1910.

=*Sphaerocarpos Michelii* Bell. App. ad Fl. Pedem. 52. 1792.

STENOPHYLLUS STENOPHYLLUS (Ell.) Britton, Bull. Torrey Club. **21**: 30. 1894.

=*Stenophyllus caespitosus* (Muhl.) Raf. Neog. 4. 1825.

TERNATEA TERNATEA (L.) Kuntze, Rev. Gen. Pl. **3**: 72. 1893.

=*Ternatea vulgaris* H. B. K. Nov. Gen. & Sp. Pl. **6**: 415. 1823.

TRIONUM TRIONUM (L.) Wooton & Standl., Contrib. U. S. Nat. Herb. **19**: 417. 1915.

=*Trionum annuum* Medic. Gesch. Malv. Fam. 47. 1787.

TSUGA TSUGA (Sieb. & Zucc.) A. Murr., Proc. Hort. Soc. Lond. **2**: 508. 1862.

=*Tsuga Sieboldii* Carr. Trait. Gen. Conif., ed. 1, 186. 1855.

In the above-mentioned article [p. 146] I made the statement, in effect, that *Foeniculum vulgare* is the oldest valid name within the genus *Foeniculum* for the plant designated by Karsten as *Foeniculum Foeniculum*. I gave as the authority and citation for *F. vulgare*, "Hill, Brit. Herb. 413. 1756." Actually, however, according to the international rules of nomenclature, the binomial *Foeniculum vulgare* was not validly published by Hill in the reference cited above, because Hill in this work does not consistently adopt the binomial system of nomenclature. The 450 or more binomials which appear in his "British Herbal" are only accidental binomials and are on this account specifically invalidated by the international rules, even though no less an authority than Druce [Rep. Bot. Exch. Cl. Brit. Isles **3**: 439. 1913] maintains that whether accidental or not, these binomials should be recognized as valid. In accordance with the international rules as adopted at Cambridge, however, the name *Foeniculum vulgare* must be accredited to Philip Miller, who first validly published it in the eighth edition of his "Gardeners Dictionary" in 1768. The paragraph should therefore read as follows:

FOENICULUM FOENICULUM (L.) Karst. Deutsch. Fl. 868. 1882.

=*Foeniculum vulgare* Mill. Gard. Dict., ed. 8, no. 1. 1768.

A study of the synonymy of several common polygonaceous plants of this region has revealed the fact that two new nomenclatural combinations are required. These, with the synonymy of the species in question, are given herewith:

Persicaria densiflora (Meisn.) comb. nov.

Polygonum densiflorum Meisn. in Mart. Fl. Bras. **5**^{1}: 13–14. 1855.[3]

Polygonum acuminatum Meisn. Monog. Gen. Polygon. Prod. 78, p.p. (1826), apud Meisn. in Mart. Fl. Bras. **5**^{1}: 14. 1855 [not *P. acuminatum* H. B. K. Nov. Gen. & Sp. Pl. **2**: 178. 1817].

Polygonum densiflorum α imberbe Meisn. in DC. Prodr. **14**: 121. 1856.

Polygonum portoricense Bertero ex Meisn. Monog. Gen. Polygon. Prod. 78, nomen nudum. 1826; Small, Mem. Dept. Bot. Columb. Coll. **1**: 46, *pl. 10*. 1895.

Persicaria portoricensis Small, Fl. SE. U. S., ed. 1, 377 & 1330. 1903.

Polygonum eciliatum Stone, Rep. N. Jersey State Mus. **1910**: 423 (1911), fide Weatherby, Rhodora **25**: 20. 1923.

Pleuropterus cuspidatus (Sieb. & Zucc.) comb. nov.

Polygonum cuspidatum Sieb. & Zucc., Abh. Akad. Muench. **4**^{2}: 208. 1846.[4]

Polygonum pictum Sieb., Jaarb. Koninkl. Nederl. Maats. Aanmoed. Tuinb. **1848**: 44. 1848.

Polygonum Sieboldi Rwdt. ex De Vriese, Jaarb. Koninkl. Nederl. Maats. Aanmoed. Tuinb. **1849**: 31. 1850.

Polygonum Zuccarinii Small, Mem. Dept. Bot. Columb. Coll. **1**: 158, *pl. 66*. 1895.

Polygonum Sieboldi De Vriese apud Bailey, Cycl. Am. Hort. **3**: 1393, *fig. 1880*. 1901.

Pleuropterus Zuccarinii Small in Britton & Br. Ill. Fl. **1**: 676, *fig. 1655*. 1913.

[3] The use of *densiflorum* as the valid specific designation for this species is not precluded by the "*Polygonum densiflorum* Blume" recorded by Jackson in the Index Kewensis (1894), because this name was apparently never published before that time, since in the reference cited by Jackson, Blume proposes it as a variety of *P. corymbosum* Willd. [= *P. chinense* L.] and it was apparently never elevated to specific rank until Jackson inadvertently did so—long after Meisner had proposed the same name for an entirely different plant.—Vid., C. A. Weatherby, Rhodora **25**: 20–21. 1923.

[4] The use of *cuspidatum* as the valid specific designation for this species is not precluded by the *Polygonum cuspidatum* of Willdenow as claimed by Small, De Vriese, and Bailey, because the use of this name by Sprengel in 1825 was in synonymy only and did not constitute valid publication.—Vid., A. N. Steward, Rhodora **32**: 223–225. 1930.

The publication of two varieties of flowering-dogwood under the generic name *Cynoxylon* by the present writer in Bull. Torrey Club **60:** 56–57 (1933) was done before his attention was called to the fact that this name was not proposed as a generic name by Rafinesque in Alsog. Amer. (1838), but only as a subgeneric one [vid., O. A. Farwell, Rhodora **34:** 29–30. 1932]. The name *Cynoxylon* Raf. does not start as a genus, then, until 1893, when it was inadvertently raised to generic rank by Jackson in the Index Kewensis. The generic name *Benthamidia* Spach (Hist. Vég. Phan. **8:** 106. 1839) therefore antedates *Cynoxylon* by fifty-four years, and the name for the common flowering-dogwood of this region should be *Benthamidia florida* (L.) Spach. The two varieties must then be renamed as follows:

Benthamidia florida var. **pendula** (Dipp.) comb. nov.
Cornus florida var. *pendula* Dipp. Handb. Laubh. **3:** 244. 1893.

Benthamidia florida var. **rubra** (André) comb. nov.
Cornus florida var. *rubra* André, Rev. Hort. **66:** 500. 1894.

Continued monographic work in the *Verbenaceae* has revealed the fact that several new names and combinations are required for some common tropical and subtropical forms of this most interesting and complex group. Among these are the following:

Amasonia campestris (Aubl.) comb. nov.
Taligalea campestris Aubl. Hist. Pl. Guian. **2:** 625, *pl. 252*. 1775.

Bouchea Rusbyi nom. nov.
Bouchea incisa Rusby, Bull. N. Y. Bot. Gard. **4:** 432. 1907 [not *B. incisa* Pearson, Trans. S. Afr. Phil. Soc. **15:** 180. 1904].

Callicarpa incana (Turcz.) comb. nov.
Aegiphila incana Turcz., Bull. Soc. Nat. Mosc. **36**^{2}**:** 218. 1863.

Chascanum adenostachyum (Schau.) comb. nov.[5]
Bouchea adenostachya Schau. in DC. Prodr. **11:** 560. 1847.

Chascanum caespitosum (Pearson) comb. nov.

[5] For details concerning the differences between the genera *Bouchea* and *Chascanum*, see the monograph of the former genus by Myrle E. Grenzebach in Ann. Mo. Bot. Gard. **13:** 80–100. 1926.

Bouchea caespitosa Pearson, Trans. S. Afr. Phil. Soc. **15**: 178. 1904.

Chascanum glanduliferum (Pearson) comb. nov.

Bouchea glandulifera Pearson in Thiselton-Dyer, Fl. Cap. **5**: 204. 1901.

Chascanum Hanningtonii (Oliver) comb. nov.

Bouchea Hanningtonii Oliver in Hook. Ic. Pl., *t. 1446*. 1883.

Chascanum hederaceum (Sond.) comb. nov.

Bouchea hederacea Sond., Linnaea **23**: 86. 1850.

Chascanum hederaceum var. **natalense** (Pearson) comb. nov.

Bouchea hederacea var. *natalensis* Pearson in Thiselton-Dyer, Fl. Cap. **5**: 200. 1901.

Chascanum hyderobadense (Rottl.) comb. nov.

Verbena hyderobadensis Rottl. ex Wall. Numer. List 215, no. 6318, hyponym. 1831; *Bouchea hyderobadensis* (Rottl.) Walp. Repert. **4**: 12. 1845.

Chascanum dehiscens (L. f.) comb. nov.

Phyrma dehiscens L. f. Suppl. Pl. 277. 1781.

Lantana Camara var. **aculeata** (L.) stat. nov.

Lantana aculeata L. Sp. Pl. 627. 1753.

Lippia Briquetii nom. nov.

Lippia floribunda Briq., Ann. Conserv. & Jard. Bot. Genève **4**: 237. 1900 [not *L. floribunda* H. B. K. Nov. Gen. & Sp. Pl. **2**: 267. 1817; nor *L. floribunda* Phil., Anal. Mus. Nac. Chile **1891**: 59. 1891].

Phyla dulcis (Trev.) comb. nov.[6]

Lippia dulcis Trev., Nov. Act. Nat. Cur. **13**: 187. 1826.

Phyla nodiflora var. **reptans** (H. B. K.) stat. nov.

Lippia reptans H. B. K. Nov. Gen. & Sp. Pl. **2**: 263. 1817.

Lupinus utahensis nom. nov.

In his "Studies on the Rocky Mountain Flora—XXVIII" [Bull. Torrey Club **40**: 43–74. 1913] Dr. Rydberg did something which, as far as I have been able to ascertain, was entirely unprecedented in botanical literature. He there proposed [p. 44] a tautonymous name as the designation of a new species. Many other botanists, as has been previously shown, had proposed tautonyms as new combinations on the basis of priority, and Huth [Helios **11**: 133. 1893] proposed a tautonym, *Bambusa*

[6] For details as to the differences between the genera *Phyla* and *Lippia*, see E. L. Greene in Pittonia **4**: 45–46. 1899.

Bambusa Huth, as a new name for an old species, *Bambusa Bambos* (L.) Druce; but Rydberg's proposal of *Lupinus lupinus* as the designation of an entirely new and undescribed species was unprecedented in the realm of botanical nomenclature. The fact that he apparently used the specific designation as an adjective (indicated by his writing of it with a small initial letter) does not alter the fact that the name is a pure tautonym and is therefore invalid under the international rules. Since, according to Dr. Rydberg, this species of lupine is limited in its distribution to the state of Utah, the name *Lupinus utahensis* is hereby proposed for it.

THE NEW YORK BOTANICAL GARDEN

Azolla caroliniana survives in Queens kettle hole pond

Raymond H. Torrey

A small colony of the tiny pteridophyte, *Azolla caroliniana*, rarely reported in our range, survives in one of the kettle hole ponds, in the terminal moraine, in Queens Borough, New York City. Possibly it is the only occurrence, in the Torrey Club range, as others reported are probably now extinct. It is such a small thing, that it may be overlooked, and there may be other colonies in favorable places, but on the record they are extremely rare in this vicinity.

Norman Taylor, in his Flora of the Vicinity of New York, (1915) recorded *Azolla* only from a small pond in Clove Valley, Staten Island, and in the Morris Canal, near Bloomfield, N. J. The Morris Canal colony is certainly extinct, for the canal has been abandoned and dried up for ten years. The ponds in Clove Valley are now included in a city park and it is probable that "improvements" and recreational uses have eliminated *Azolla* there, too.

The Queens Borough colony is in one of a group of kettle hole ponds which have long been a resort for members of the Torrey Botanical Club and the New York Microscopical Society. Such unusual plants, for the territory of Greater New York, as *Orontium aquaticum*, *Riccia fluitans* and *Ricciocarpus natans* survive in these ponds. But recent parkway and park improvements have destroyed some ponds, and conventionalized others. The pond where the *Azolla* survives has been partly filled in by the landscaping of the new Grand Central Parkway. It is located about 1000 feet east of Rocky Hill Road, which runs north from Hillside Avenue, a mile north of Queens Village.

Azolla is a beautiful plant, under a hand lens, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, $\frac{1}{8}$ to $\frac{1}{4}$ inch wide with its generally wedge shaped fronds, divided into minute branches, greenish with red tips, and in the mass gives a bronze effect. It floats on the surface, in this locality, amidst dense colonies of the floating Duck Meat, *Lemna*.

To any one finding it for the first time, like this writer, it would be puzzling where to look for it in the manuals. It suggests a minute floating hepatic, such as the *Riccias*. Dr. Marshall A. Howe who identified it for me, says the plant has been

used in Europe to keep down mosquitoes. In favorable conditions, it grows so densely as to cover the water with a mat that keeps out light and air, thus restricting the development of mosquito larvae. In the Queens locality it was not as dense as this, merely scattered plants, a few to the square inch, floating among the much denser *Lemna*. Since pending plans for further park development are likely to obliterate this kettle hole altogether, perhaps some of this *Azolla* could be transplanted into some pond or still stream where it would be permanently safe. It ought to do well in water gardens, and would make an unusual species and give an attractive color growing in masses.

QUEENS—LONG ISLAND, N. Y.

New stations for Physoderma and Ligniera

J. S. Karling

In the summer of 1933 while collecting aquatic plants, algae and fungi in the vicinity of New York City the author encountered a species of *Physoderma* and two of *Ligniera*, which, as far as he is aware, have never been reported from this particular locality. *Physoderma zeae-maydis* was found fairly abundant on maize in a small field a short distance from the railway station at Cold Springs Harbor, Long Island. According to Lyman (1918) and Tisdale (1919) this parasitic chytrid has not been observed along the Atlantic coast further north than southern New Jersey, and its presence on Long Island suggests at least that it may have a more extensive distribution than is generally suspected. It grows readily in the leaves and sheaths of corn in New York City, as has been shown from inoculated garden plots at Columbia University, and it is not improbable that during the summer months it may extend into New England as well. The infected plants discovered on Long Island were badly spotted and streaked, and on being examined microscopically the cells were found to be filled with a tenuous rhizomycelium, sporangia and spindle-shaped organs. Whether or not the disease became sufficiently severe to have a pronounced effect on the yield in uncertain, since the corn had not yet reached the tassel stage at that time.

The two species of *Ligniera* referred to were found in the roots of *Alisma plantago-aquatica* and *Isoetes lacustris* from Van Cortlandt Park, New York City and Culver Lake, New Jersey respectively. Plasmodia and sporangesori in several stages of development were very abundant in the roots, but no signs of hypertrophy were evident. The genus *Ligniera* was established by Maire and Tison (1909–1911) to include all species of the Plasmodiophorales which fail to produce hypertrophy of the host tissues, and in this respect the species which occur in *Alisma* and *Isoetes* are to be classed in this group. While the author doubts the validity of this genus, the generic name will nonetheless be employed in the present paper. These two species appear identical in size and development with *L. alismatis* and *L. isoetes* described by Schwartz (1914) and Palm (1918) from

the same hosts. *L. alismatis*, however, has been shown by Cook (1926) to be synonymous with *L. junci*, *L. graminis*, *L. bellidis*, and *L. menthae* as far as host relationship, general structure and development are concerned, and the name *L. junci* will be retained by the author for the species found in Van Cortlandt Park. There are no reports in the literature as far as I know of the occurrence of *L. junci* and *L. isoetes* in America, and the present discovery indicates that species of parasitic slime molds are widespread in their distribution. A more intensive study on the cytology and cross inoculation of these two species is now under way and will be reported later.

COLUMBIA UNIVERSITY, NEW YORK CITY

Bibliography

Cook, W. R. I. The genus *Ligniera* Maire & Tison. Trans. Brit. Mycol. Soc. 11. 196–213. *Pls. 8–9.* 1926.

Lyman, G. R. Plant disease survey work on the *Physoderma* disease of maize. Jour. Wash. Acad. Sci. **8:** 43–44. 1918.

Maire, R. and A. Tison. La cytologie des Plasmodiophoracées et la classe des Phytomyxinae. Ann. Mycol. **7:** 226–253. *Pls. 4–6.* 1909.

Maire, R. and A. Tison. Sur quelques Plasmodiophoracées non hypertrophiantes. Comp. Rend. Acad. Sci. Paris **152:** 206–208. 1911.

Palm, B. Sur une Plasmodiophoracée nouvelle, *Ligniera isoetes*. Svensk. Bot. Tidskr. **12:** 228–232. 1918.

Schwartz, E. J. The Plasmodiophoraceae and their relationship to the Mycetozoa and the Chytrideae. Ann. Bot. **28:** 227–240. *Pl. 12.* 1914.

Tisdale, W. H. *Physoderma* disease of corn. Jour. Agri. Res. **26:** 137–154. *Pls. A, B, 10–17.* 1919.

A New Texan Coryphanta

Leon Croizat

Like Africa, the Trans-Pecos region of Western Texas would seem to hold in store for the taxonomist "semper aliquid novi." Mr. A. R. Davis of Marathon has recently sent me for determination specimens of a diminutive form of the genus *Coryphanta* for which I have found no established species, it being quite distinct from *Coryphanta Nickelsae* (K. Brandegee) Britton & Rose, and *Coryphanta radians* (D. C.) Britton & Rose, which it resembles more closely than any other species I know. The description of the type may be given as follows: **Coryphanta Nellieae** Croizat sp. nov.—Plant small, simple or more seldom (one specimen of six observed) sparingly cespitose, with a cylindric body up to 4.5 cm. long, the hypogeal part 2–3 cm. long; ribs 8–14; tubercles grooved, 2 mm. long; areolae scarcely woolly; central spine wanting; radial spines 13–18, spreading to slightly appressed, straight, rarely curved sidewise, yellowish at the base otherwise white, occasionally pinkish; 2, 3, or 4 of the spines stouter than the rest and up to 4–4.5 mm. long, short-acuminate; 4, 5 or 6 of the spines slender, acicular or bristle-like, about 2 mm. long; flower, including the ovary (hypanthium) 1–1.5 cm. long, persistent; perianth about 1 cm. long; sepals lanceolate to cuneate, acute or acuminate, greenish; petals purplish or purple, oblanceolate to spatulate, obtuse; ovary cylindric, naked; fruit (berry) and seeds not seen.

Planta pusilla simplex, raro caespitosa, cylindrica, ad 4.5 cm. longa, parte hypogea 2–3 cm. Costis 8–14, tuberculis rima percursis, 2 mm. longis; areolis vix lanosis; spina centrali nulla; spinis radialibus 13–18 ex patentibus tenuiter adpressis, rectis, raro ad latus incurvis, basi luteis caeterumque albis, interdum roseatis; 2–4 spinis caeteris robustioribus ad 4–4.5 mm. longis, breviter acuminatis; 4–6 spinis setarum adspectum fingentibus, tenuiter aciculatis, circa 2 mm. longis; flore (cum hypanthio) 1–1.5 cm. longo, persistenti: perianthio ad 1 cm. longo; sepalis e lanceolatis cuneatis, acutis vel acuminatis, viridescentibus; petalis purpureis vel purpurascentibus ex oblanceolatis spathulatis, obtusis; ovario cylindrico, nudo; fructum seminaque non vidi.

In limestone formation at 4000 feet altitude, about 4 miles south of Marathon, Brewster County, Texas.
Named for Mrs. Nellie Davis, wife of the collector of the type specimen.—Early spring—Type specimen in the Herbarium of the New York Botanical Garden.

This Cactus is found in a restricted area on the slopes of high hills in gravelly soil, living in places where a temperature as low as 28 degrees is sometimes recorded for short periods of time. It blossoms late in years of drought. No specimens have been collected so far that form more than six heads.

NEW YORK, N. Y.

BOOK REVIEW

A Botanist Explores the Jungle*

Adventure, thrills—daring and dangers; all are suggested by the title of Dr. Rusby's book, all and more are found in it. A young man just graduated from medical college, Dr. Rusby was sent down to South America, forty-nine years ago to study medicinal plants. Especially, he was to collect a supply of coca leaves for experimental study in the United States and to study methods of its cultivation and use by the natives of Bolivia. Also he was to study chinchona both from the botanical and pharmaceutical standpoints. At that time conditions of travelling and living in South America were very different from the conditions to-day. After completing his work for the firm Dr. Rusby decided to cross the continent from Bolivia, continuing his botanical studies. He knew it was a hazardous undertaking; his acquaintances in South America assured him it was foolhardy and impossible. With an Englishman he met in LaPaz he crossed the Andes to one of the small tributaries of the Amazon. There the mules were sent back with most of the specimens so far collected and the journey continued by raft and, later, by boat. In a small village two Texan fugitives from justice were met and added to the party.

The first eight chapters describe the exploring and collecting in Peru, Bolivia and Chile, the remainder and greater part of the book, describes the trip across the Andes, down to the Amazon and across to Para. Anyone who enjoys good travel stories—and who does not—is sure to enjoy this volume and to thrill with the experiences of the explorer. There are constant references to the plants of the region and to the insect, bird and mammalian life that add to the interest of the book to botanists and nature lovers generally.

There are a few references to the trip across the same regions in 1921 showing the changes that had occurred in thirty-five years and adding some details to observations made earlier.

That the trip had important scientific results is shown by the fact that for fifteen years after his return in 1886 nearly every volume of the Bulletin of the Torrey Botanical Club had articles describing the new plants collected by Dr. Rusby.

GEORGE T. HASTINGS

* Jungle Memories, Henry H. Rusby. 388 pp., 16 plates. Whittlesay House, McGraw-Hill Book Co., 1933. $3.50.

FIELD TRIPS OF THE CLUB

Field Trip of Sunday, November 5, Suffern to Ramapo

In the morning the flora along the Hillburn-Torne-Sebago trail was examined. Interesting from a phenological standpoint was the precocious appearance of very young sporophytes of *Ceratodon purpureus*, and, somewhat farther on, the delayed flowering of *Corydalis sempervirens*, one inflorescence of which was still blooming vigorously. *Buxbaumia aphylla* was found, rather commonly.

The afternoon was devoted to a study of the liverworts growing in and near Torne Brook. This locality, with its springs and shaded stream, is distinctly favorable for the growth of this group of plants. The species seen included the following: *Conocephalum conicum*, *Blasia pusilla* (with stellate gemmae), *Frullania eboracensis*, *Frullania riparia*, *Porella pinnata*, *Calypogeia Trichomanis*, *Lepidozia reptans*, *Bazzania trilobata*, *Scapania nemorosa*, *Diplophylleia apiculata*, *Plagiochila asplenioides*, *Cephalozia bicuspidata*, *Cephalozia curvifolia*, *Lophocolea heterophylla*, *Trichocolea tomentella*, *Ptilidium pulcherrimum*, and *Anthoceros laevis* (in fruit).   Edwin B. Matzke

Field Trip of November 11

On the afternoon of November the eleventh, the Torrey Botanical Club was given an opportunity to visit behind the scenes at the American Museum of Natural History. A party of eighty was conducted by Mr. S. Harmsted Chubb through the laboratories of the Departments of Preparation, of Osteology, and of Marine Life, and to the Akeley African Hall to see the work in process of construction and to hear about the methods of preparation of the specimens and groups to be placed on exhibition.

Mr. Chubb was assisted in the several departments by Dr. James L. Clark, Vice-Director, by Mr. John Saunders of the Department of Education, and by others in charge of special branches of the work.

In the Department of Lower Invertebrates, of which Dr. Roy W. Miner is Curator, the party saw the beautiful Coral Reef Group, now approaching completion. Mr. Chris Olsen,

chief of construction of this exhibit, described the difficulties encountered in the handling and supporting of so much massive coral, and of the methods used in representing truthfully a scene under seas.

Dr. Clark, in charge of Preparation, gave us a general account of the intricate variety of work required in order to reproduce realistic groups of animals in their natural habitats. This comprises the collection of the animals required for the group, and of botanical specimens and other accessories, the making of field color sketches and of plaster casts of leaves and other parts of plants, and then, in the laboratory, designing and constructing small models of the scene chosen, which serve to visualize the group to be completed.

In the laboratory where the accessories for the groups are being prepared, Mr. Albert E. Butler, who has charge of this delicate and important part of the preparation, told about the making and coloring of wax flowers, leaves, and other parts of plants, and of rock work, and of the assembling of other material required.

The mounting of the mammals themselves was explained by Mr. Saunders, who also took us to the unfinished Akeley African Hall to show us how the beautiful and comprehensive plan of Carl Akeley is becoming a reality. Several of the groups are already installed and now nearing completion, while the work on the building and other groups is steadily progressing.

Lastly we were conducted by Mr. Chubb to his Osteological Laboratory in the Department of Comparative Anatomy and to the Osteological Exhibition Hall where he is expressing action and animal mechanics in mounted skeletons. In explaining his manner of procedure, he told of the methods of obtaining necessary photographic studies of animals in action, of the careful study during dissection of the specimen to be mounted, the cleaning and preparation of the bones, and then the reassembling of these bones in life-like pose to express a specific action.

S. H. and E. D. Chubb

Field Trip of November 26

Brown-fruited Umbilicaria pustulata

Study of lichens on the top of Bear Mountain, on the field trip of Sunday, Nov. 26, disclosed one thing that seemed unusual.

a colony of the Blistered Rock Tripe, *Umbilicaria pustulata* on several closely adjoining ledges, which bore brown apothecia, instead of the usual black ones. Every apothecium on the thalli in this area, several rods wide, was brown, while on other colonies, on the mountain top, the usual black fruit were found. The thalli with brown apothecia did not appear to be diseased or abnormal, and the color did not seem attributable to any outside interference, such as eating by slugs or insects. In some cases the brown color was almost reddish brown. I find no mention of such a color in available lichen guides.

Interesting crustose lichens found on this trip were *Rinodina oreina*, which I have regarded as a plant of boreal islands in this vicinity, usually finding it around 1,000 feet or above, although there is some on glacial boulders on Montauk Point; and *Lecanora tartarea*, the dye and litmus producing lichen, occasional in high places in the Highlands. Colonies of a pretty servediose *Physcia*, which Mrs. G. P. Anderson thinks is *P. clementina*, not before reported in North America, were also found.

Cladoniae were ample in quantity and fairly varied in species, including *C. cristatella*, *ff. vestita* and *Beauvoisii; C. squamosa*, form undetermined; *C. Floerkeana*, *C. coniocraea*, *ff. ceratodes* and *truncata; C. borbonica*, *f. cylindrica*, a somewhat unusual species, resembling *C. coniocraea* at first sight and apt to be mistaken for it but distinguished by the granulate and isidiate soredia on the bases of the podetia, and by tiny brown apothecia; *C. uncialis*, near *f. dicraea; C. rangiferina*, *C. furcata*, var. *racemosa*, *f. corymbosa;* and var. *pinnata*, *f. foliolosa; C. bacillaris*, *C. papillaria*, *f. papillosa*, *C. caespiticia*, and *C. chlorophaea*, *ff. simplex* and *carpophora*.

While working on the Appalachian Trail, on Kittatiny Mountain, Warren County, N. J., a week later, and looking for more brown-fruited *Umbilicaria pustulata*, I found the plant growing on wood, the first time I ever saw it elsewhere than on rocks. Several normal looking and fruiting thalli were growing on a dead stick, two feet long, which lay on boulders thickly covered with this lichen, on the west shore of Sunfish Pond. These boulders are densely coated with a variety of lichens, including *Rinodina oreina*, *Lecanora tartarea*, *Stereocaulon paschale*, *Parmelia conspersa* and *saxatalis*, and *Lecanora cinerea*.

Dr. A. W. Evans, of Yale University says he has never seen Umbilicaria growing on wood, but notes that R. Heber Howe

mentioned it as on wood, in his paper on the "Lichens of Mount Katahdin, Main, Bryologist 16: 33, 1913, and figured it on a plate therein.

R. H. Torrey

Field Trip of December 10

A party of six members and guests visited the Wawayanda Cedar Swamp in New Jersey on December 10 on a cold clear day. The swamp was entirely frozen and two inches of ice had formed on the pools.

Lichens were in fine condition and grew luxuriantly in the swamp area. *Graphis recta*, with black lines of fruit parallel to the lenticels, was found in abundance on a fallen yellow birch log. *Graphis scripta*, with the fruit more irregularly placed, was discovered on the bark of an oak. Throughout the swamp, in especial abundance on tree trunks, the silvery gray thallus of *Parmelia physodes* with upturned, frosty sorediate-tipped lobes, was in sight. Other Parmelias were also common in the region. *P. caperata*, a yellow green mat on tree trunks; *P. conspersa*, a straw colored mat with a dark green center and chestnut brown apothecia, on rocks; *P. saxatilis* with narrow gray thallus lobes marked by net lines on the upper surface, on tree trunks; *P. rudecta*, with broad gray lobes and with coralline (isidoid) surface in the center, on trees; and *P. subaurifera* an olive green mat closely pressed to the tree trunks and bursting here and there with masses of yellow soredia; were all observed. In the swamp the light gray, foliose *Cetraria atlantica* was found on the branches of conifers, and the crustose *Pertusaria velata*, with lighter margin and immersed apothecia and *Buellia myriocarpa*, with tiny black apothecia and hardly any thallus, on the trunks of other trees. Cladonias too were not lacking. The ubiquitous red-topped *Cladonia cristatella* and gray-cupped *C. chlorophaea* were of course everywhere. *Cladonia coniocraea* was found with brown apothecia tipping its slender awl-shaped podetia. The fruit is rather uncommon in this region. *Cladonia bacillaris*, a slightly stouter species with more sorediate podetia, was also found. *Cladonia incrassata* with sorediate podetia and red fruit mostly on one side of the podetia, and *C. delicata*, a tiny brown-fruited form which has finely cut fern-like primary squamules bearing granular soredia, were also discovered. A few greenish-hairy thalli of *Usnea barbata* and brown stunted hairs of *Alec-*

toria chalybeiformis were gathered on trees. On dry ground outside the swamp *Cladonia furcata* was found, and a little *Cladonia rangiferina*. On the rocks of the deciduous forest outside the swamp, *Lecanora cinerea*, *albocaerulescens* and *Crocynia lanuginosa* were common. *Lecanora tartarea* and *Cetraria glauca* were also found on rocks.

Mosses and liverworts carpeted the swamp floor together with sphagnum. *Hypnum imponens* was fruiting commonly. The gemma cups of *Georgia pellucida* were collected. On dryer ground, *Bryum caespiticum* was in fruit. One of the fallen logs in the swamp was covered with a hairy liverwort (*Ptilidium pulcherrimum*) fruiting abundantly. Others in the swamp were: *Bazzania trilobata*, *Pallavicinia lyellii*, and *Calypogeia trichomanis* on rotting logs. The tiny brown *Frullania eboracensis* was common on the trunks of deciduous trees.

The cedar swamp is one of the finest wild spots left near New York City. Dense thickets of *Rhododendron maximum* form the undergrowth, the red cedar and hemlock are the dominant tree growths. Along the stream in the swamp are typical wet ground species; button bush, kinnikinnik, witch hazel, red maple sweet pepper bush, and high bush blueberry.

On return to the city, the party was entertained for supper at the home of Miss Eleanor Friend and afterwards the specimens gathered were reviewed.

JOHN W. THOMSON, JR.

PROCEEDINGS OF THE CLUB

Meeting of October 18, 1933

The Meeting was called to order at the New York Botanical Garden at 3:30 P.M. by Dr. Howe. There were 26 members present.

The minutes of the meetings of May 17 and October 3 were read and approved.

The following were unanimously elected to membership in the club: Professor E. B. Babcock, University of California, Berkeley, Cal.; Mr. Ruben de Souza Carvalleo, Escola Superior de Agricultura, Piracicala, Sao Paulo, Brazil; Miss Genevieve Clulo, Department of Botany, West Virginia University, Morgantown, W. Va.; Mr. S. M. Pady, the New York Botanical Garden, New York, N. Y.

The loss of Mr. Eugene A. Rau by death was reported and the deep regret of the club expressed. Dr. D. H. Campbell of Stanford University, California, who has been a member of the Club for a number of years, was present, the first time he has been able to attend a meeting of the club.

Dr. B. O. Dodge, Plant Pathologist at the New York Botanical Garden gave a talk on "Haustoria of Gymnosporangia." This paper is being published in the Proceedings of the National Shade Tree Conference.

Miss A. Aronescu of the New York Botanical Garden gave a talk on "Early stages of infection and haustorium formation of the Rose Black Spot Fungus.

Forman T. McLean
Secretary

Meeting of November 15, 1933

The Meeting was called to order at the New York Botanical Garden at 3:30 P.M. by President Blakeslee. There were 25 members present.

The minutes of the meeting of October 18 were read and approved.

The following were unanimously elected to membership in the Club: Mr. Robert T. Clauson, Botany Department, Cornell

University, Ithaca, N. Y.; Miss Dorothy M. Miller, 3228 Decatur Avenue, New York, N. Y.; Miss Hazel Holly, Montefiore Hospital, Gun Hill Road, New York, N. Y.

The resignation of Professor Will S. Monroe was accepted with regret.

Dr. Paul R. Burkholder of Columbia University gave a talk on "Movement in the Blue Green Algae."

Mr. Edmund H. Fulling of the New York Botanical Garden gave a talk on "Microprojection of Cross-Sections of Fir Leaves."

Forman T. McLean
Secretary

Meeting of December 5, 1933

Meeting was called to order at the American Museum of Natural History at 8:15 p.m. by President Blakeslee. There were 50 members present.

Dr. Paul R. Burkholder, Schermerhorn Hall, Columbia University, New York City and Mr. Andor Hacker, 2474 Valentine Avenue, New York City were unanimously elected to membership in the Club.

A talk on "Plants of Hawaii" was given by Mr. Otto Degener, now at the New York Botanical Garden, who was a resident in the Hawaiian Islands for a number of years.

The subject, essentially a review of the speaker's first book, dealt with the volcanic origin of the Islands, their initial barren character and their gradual acquirement of a native flora by the import of spores and seeds through the agency of wind, ocean currents and birds. Due to geographic isolation and to changed ecologic conditions, the early plant immigrants to Hawaii for the most part gave rise to offspring now differing from their congeners remaining on the continents. So many of the offspring have become modified that 85 percent of the native Hawaiian flora is peculiar to the Islands.

Since the coming of the Polynesian, Caucasian and Oriental Races, the character of the flora in the Hawaiian Islands is radically changing. The Polynesians introduced various plants valuable as food or in their pursuit of the arts and medicine. Among these may be mentioned the banana, the breadfruit, the mountain apple, certain varieties of coconut and sugarcane, the

taro, the paper mulberry, *Taetsia* (dracena), and the awa (*Piper methysticum*). Since the discovery of the Islands by Captain Cook in 1778, the Caucasians and Orientals, in their turn, introduced plants considered by them valuable or desirable. Among these may be mentioned the commercial forms of sugarcane and pineapple; and rice, lotus, mango, coffee, avocado, mesquite (*Prosopis chilensis*), papaya, guava; scores of cultivated fruits and vegetables; and ornamental plants and fodder grasses. With the enormous increase of local shipping, a host of unwelcome plants have also reached these islands from foreign shores. Many of these have become naturalized and now thrive as weeds at low and middle elevations.

The native Hawaiian flora, isolated for hundreds of thousands of years on these islands, was spared much of the keen competition to which most continental plants were exposed. Hence it is somewhat archaic in character and delicate. With the coming of man, particularly within the last 150 years, this former idyllic balance of nature in the Islands has changed. Vast areas have been cleared of all native vegetation for the cultivation of sugarcane, pineapple and other crops. Vast areas have been browsed bare by livestock. The land that is still available for the growth of native plants is being overrun by aggressive continental weeds. As a result, the greater part of the unique native Hawaiian flora is doomed to extinction, and much of this flora is still relatively unknown!

Mr. Degener, who brought his herbarium of about 40,000 specimens to New York for critical study, exhibited 150 plates of his new Hawaiian flora. The best set of his collection is now being incorporated in the herbarium of the New York Botanical Garden.

FORMAN T. MCLEAN
Secretary

NEWS NOTES

Professor William Lynn Jepson of the Department of Botany at the University of California was recently appointed faculty lecturer for 1934. This is the highest honor that can be given a member of the faculty. Professor Jepson established the Botanical Journal, "Erythea" and is the author of the Manual of Flowering Plants of California and is working at present on, "The Flora of California," which is being published in sections.

Dr. George J. Peirce has retired from the chair of botany at Stanford University with the title of professor of botany, emeritus. Dr. Peirce has been connected with Stanford University since 1897, when he was appointed assistant professor of botany.

Preliminary announcements have been sent out for the Sixth International Botanical Congress to be held in Amsterdam from September 2 to 7, 1935. The congress will be divided into ten sections which will meet mornings and afternoons, there are to be general evening meetings and excursions to laboratories, centers of flower culture and to the Zuider Zee.

At the Boston meeting of the American Association for the Advancement of Science Dr. William H. Eyster of Bucknell University was elected chairman of the botanical section and Dr. A. S. Foster of Norman, Oklahoma, secretary. The Botanical Society of America elected Dr. Elmer D. Merrill of the New York Botanical Garden president and Dr. H. L. Shantz of the University of Arizona vice-president.

The New York Academy of Science has elected Dr. Marshall A. Howe president for the year 1934.

On January 18th Morrill Hall of the University of Tennessee was destroyed by fire. Besides scientific instruments the herbarium of the university was destroyed.

Science reports the death of Andrew C. Life, professor of botany at the University of Southern California, Los Angeles. Mr. Life had been on the faculty of the university since 1907 and was sixty-four years old.

Water Plants at the New York Botanical Garden

At the New York Botanical Garden there is at present a unique exhibit of aquarium plants. Partly from the Garden's own collection and partly from the professional dealers in aquarium supplies, there has been assembled some sixty different water plants suitable for aquarium use.

In some of the aquaria the plants are shown by themselves with lables on the glass giving the names. Another series of aquaria are beautifully arranged with different plants and with many species of tropical fish.

The exhibit opened at Christmas time and will be kept until the end of March.

Collection of Living Cycads at the Brooklyn Botanic Garden

Students of the cycads will be interested to know that the collection of living cycads at the Brooklyn Botanic Garden is now complete as to genera. The last accession was the curious fern-like member of the group, *Stangeria paradoxa*, from Natal, South Africa, which was acquired in 1931 and seems now to be thriving. A *Leaflet* describing the collection has just been issued by the Garden. The collection is housed in the conservatories of the Garden (House 12). The nine genera now extant are represented by the following species:

1. *Cycas circinalis*
2. *Cycas media*
3. *Cycas revoluta*
4. *Bowenia spectabilis* var. *serrulata*
5. *Macrozamia Moorei*
6. *Macrozamia tridentata*
7. *Stangeria paradoxa*
8. *Encephalartos Hildebrandtii*
9. *Dioon edule*
10. *Microcycas calocoma*
11. *Ceratozamia mexicana*
12. *Zamia floridana* var. *Purshiana*

THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 60, published in 1934, contained 682 pages of text and 32 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.

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BY
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John Torrey, 1796-1873

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

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Some botanical aspects of the Hawaiian Islands

T. G. Yuncker

The Hawaiian Archipelago is a group of islands of volcanic origin extending for more than a thousand miles from the northwest to the southeast between twenty and thirty degrees north latitude in the mid-Pacific Ocean. Most of the islands comprising the group are small, uninhabited, and of importance chiefly as bird sanctuaries. The largest islands of the group, and those generally referred to as "The Hawaiian Islands," are eight in number (Niihau, Kauai, Oahu, Molokai, Lanai, Kahoolawe, Maui, and Hawaii). These larger islands are believed to represent the younger in the archipelago and lie at the southeastern limits of the group. The island of Hawaii, the largest in the entire group, continues to exhibit volcanic activity and at the live crater of Kilauea one finds an excellent laboratory for the study of vulcanology. The islands of Niihau and Kahoolawe are small, low and uninhabited excepting for caretakers of stock which is grazed on them. The island of Lanai which is also comparatively small, is controlled by a pineapple canning company and is developed almost exclusively as a pineapple plantation. The other five islands are much larger and are highly developed agriculturally and support a population of about four hundred thousand persons.

Geographically the Hawaiian Islands represent the most isolated land area in the world. More than 2000 miles of great ocean depths separate them from any other high land masses. This extraordinary isolation has had a remarkable effect on the plant and animal life of the islands.

The plant life of the islands is abundant and rich in species. Because of the isolation of the islands, the origin of the flora and the manner of its migration present problems which continue to puzzle botantists and many theories have been advanced in explanation.

Whether they arrived buoyed up and floated by ocean currents, wafted by the wind, or came as passengers on floating logs or clinging to the feathers or feet of migratory birds, the great distances necessarily traversed make it appear improbable that plants or their reproductive structures reached the islands frequently or in abundance.

Hillebrand in 1880 in his "Flora of the Hawaiian Islands" included approximately 1000 species of ferns and flowering plants. More extensive and intensive explorations of the islands together with several critical monographic treatments of some of the higher groups have been made since that time. While the mosses and fungi have been studied, the other groups of lower plants are not so well known. A careful taxonomic study of the algae or lichens, for example, would undoubtedly reveal many species now unknown to science. The total number of species in the Hawaiian flora, exclusive of the large number of introduced forms, while not definitely known, must certainly now greatly exceed the number included in Hillebrand's "Flora."

A great diversity of ecological conditions is found on the islands, ranging from the tropical climate of the coast and lowlands to the occasionally snow-clad tops of Mauna Loa and Mauna Kea, and from moist, rain- and fog-swept fertile valleys and windward mountain slopes to arid and semiarid ridges and sand dunes on the leeward sides of the islands. This great diversity of ecological conditions affording maximum opportunity for growth and development, together with the isolation and consequent freedom from the influence of a surrounding flora, probably is largely responsible for the remarkably high degree of endemism which amounts to between 80 and 90 percent.

For purposes of a brief discussion, the flora may be considered under the following four categories:

a—Native plants.

b—Economically useful plants of early Hawaiian introduction and now mostly well established.

c—Weeds, chiefly of the wayside and fields.

d—Recently introduced plants of economic importance.

Several unfavorable influences have had a marked effect on the extent and distribution of the native flora. Hogs were introduced in prehistoric times, and goats, cattle and horses were early introduced by the whites into the islands. Many of these

animals, especially the goats and the hogs, became wild and have multiplied in great numbers. Because of the grazing and rooting in the forests by these wild animals, as well as by tame herds, a great amount of damage has been done to the native flora. Forested areas have been destroyed and many species of plants have been greatly reduced in numbers and in some instances exterminated.

Within the past few years tracts of land, including important water-shed areas, have been fenced and grazing in them is now prohibited. Reforestration in these and in other regions where grazing is restricted is aiding in promoting conditions favorable for the reestablishment of the original flora. In the course of time, large acreages of tillable land were placed under cultivation. Introduced weeds became more and more abundant. Many native plants, unable to successfully compete with the advance of cultivation and the more vigorous weedy species, were compelled to retreat up the valleys and mountain slopes. At the present time it is necessary to go a considerable distance from the cultivated areas before a typical native flora may be found.

At one time a considerable amount of sandalwood grew in the forests of the islands. This was in great demand in the Orient where there was a ready market for it. Exportation of the wood began in the latter part of the eighteenth century when its commercial value became recognized. Replanting when the trees were removed was not practiced and by 1850 practically every tree of marketable size had been cut. This ruthless despoiling of the forests of this formerly abundant species had no little effect on the makeup of the associated flora.

The native flora presents several interesting features. Several of the larger plant families are conspicuous because of the comparatively small number of species which are found. This is especially true of some of the larger monocotyledonous families. Only three native species of orchids are found for example, which is in striking contrast to many other parts of the world with similar growing conditions. There are no native Gymnosperms, and the palms are represented by the single genus *Pritchardia*. On the other hand, some families exhibit an unusually large number of species. The family *Lobeliaceae*, for example, is represented by over a hundred species many of which are

uniquely arborescent with tufts of leaves at the top of woody stems several feet high.

The islands are mostly mountainous. The mountains are commonly steep and precipitous on the windward side but slope more gradually to the leeward. On Kauai, Oahu and Molokai they scarcely reach 6000 feet in height. The extinct crater of Haleakala on the island of Maui and the peaks of Mauna Loa and Mauna Kea on Hawaii, however, are more than 10,000 feet high. The moisture-laden clouds are caught by peaks 4000 to 6000 feet high with a resulting abundant precipitation. Above these levels the amount of rainfall diminishes and is comparatively small above 10,000 feet.

The great differences in altitude and in moisture have produced vegetation zones that are, in the main, well marked. The zones are not constant as to altitude or extent on the different islands. They may also vary on the different sides of the same island with the forest zones usually extending to lower levels on the windward than on the leeward side. In general, however, five principal zones of vegetation are to be recognized:

1—Littoral zone, including sand beach and swampy areas along the coast.

2—Lowland zone, open grazing and cultivated areas mostly below 1000 feet altitude.

3—Lower forest zone with upper limits of 2000 to 3000 feet altitude.

4—Middle forest zone with upper limits of 5000 to 6000 feet altitude.

5—Upper forest zone found only on the higher mountains and extending to 8000 or 10,000 feet altitude.

The coast is quite variable in character. In some places it is rocky while in others it is sandy with accompanying small sand dunes or it may be a mud flat. Typical genera of this coastal zone are: Pandanus, Cenchrus, Panicum, Scirpus, Cocos, Batis, Sesuvium, Capparis, Prosopis, Tephrosia, Tribulus, Gossypium, Hibiscus, Sida, Waltheria, Calophyllum, Rhizophora, Terminalia, Cuscuta, Cordia, Heliotropium, Vitex, Scaevola, and Pluchea.

The lowland zone extends from the littoral zone to the lower limits of the forest but generally not exceeding 1000 feet altitude although the upper limits vary greatly on the different sides of

the islands. It is mostly open cultivated or grazing land with isolated specimens or scattered clumps of trees and shrubs. It is here that one finds the great sugar-cane and pineapple plantations. Introduced weeds also find conditions most congenial for their development. Where sufficient moisture is present grass may be more or less abundant. Shrubby thickets especially of the introduced *Lantana camara* and *Psidium guajava* are abundant along the bottoms and sides of gulches and valleys and the introduced *Opuntia megacantha* Salm-Dyck is common in the more arid regions, especially on Oahu. Several of the genera which occur in the littoral zone are also to be found here as well as are some which are typically of the forest zone which generally extends down the moist gulches and valleys. Some typical genera of this zone are: Gleichenia, Sphenomeris, Sadleria, Cordyline, Dracaena, Pipturus, Osteomeles, Acacia, Leucaena, Erythrina, Pelea, Aleurites, Dodonaea, Sapindus, Sida, Waltheria, Wikstroemia, Styphelia, Osmanthus, Clermontia, Scaevola, and Heteropogon.

The forest extends from the upper edge of the lowland zone to about 10,000 feet. Three zones are recognized each with more or less distinctive species, yet showing considerable overlapping: a lower more or less open forest with Gleichenia, Cibotium, Freycinetia, Zingiber, Pipturus, Pittosporum, Aleurites, Ilex, Elaeocarpus, Xylosma, Eugenia, Metrosideros, Cheirodendron Maba, Osmanthus, Alyxia, Gouldia, Straussia, and Scaevola as common genera; a middle zone including Gleichenia, Dryopteris, Cibotium, Pritchardia, Peperomia, Broussaisia, Euphorbia, Viola, Eugenia, Metrosideros, Cheirodendron, Labordea, Suttonia, Phyllostegia, Gardenia, Gouldia, Kadua, Nertera, Lobelia, Scaevola, and Dubautia as representative genera; and the upper forest zone extending to the upper limits of the highest mountains includes Acacia, Wikstroemia, Vaccinium, Coprosoma and Argyroxyphium.

Some of the most interesting regions are the so-called alpine bogs which occur between 4000 and 6000 feet altitude in a few places in the islands. The largest ones are on Kauai near Mt. Waialeale and on Puu Kukui and Mt. Eeke on west Maui. The bogs are open with scattered islands or intrusions of dwarfed trees and shrubs and covered with tussock-forming species of grasses and sedges. *Oreobolus furcatus*, *Panicum imbricatum* and

P. isachnoides are three of the commonest species. Other characteristic genera found in the bogs are Schizaea, Selaginella, Viola, Lobelia, and Argyroxyphium.

The Hawaiians originally made considerable use of plants and of their products for food, clothing, dyestuffs, medicines, etc., and possessed much knowledge regarding plants and their products. They knew and named the plants which they found or used and in many instances employed a form of binomial nomenclature.

A number of species of economic importance now cultivated or well established, especially in the fertile valleys originally inhabited by the natives, were probably of very early introduction. Among the commonest and more important species are the sugar-cane, banana, coconut, awa (*Piper methysticum*) from the root of which a medicine and an intoxicating beverage were produced, taro (*Caladium colocasia*) from the rootstock of which poi, one of the principal foods of the natives is obtained, breadfruit, wauke (*Broussonetia papyrifera*) which furnished the bark from which the bark cloth known as tapa or kapa was manufactured, and noni (*Morinda citrifolia*) which furnished dyestuffs for tapa cloth and also was useful in preparing a beverage and medicines.

The weedy species observed along the roadsides and in the fields and pastures have gained entrance mostly as stowaways and have come from many different parts of the world. To the visitor from midwestern America such plants as *Cenchrus echinatus*, *Rumex acetosella*, *R. crispus*, *Portulaca oleracea*, *Prunella vulgaris*, *Solanum nigrum*, *Erigeron canadensis*, *Leontodon taraxacum*, and *Sonchus oleraceus* are a few plants he can recognize in an otherwise almost wholly alien flora. Some species purposefully introduced have also become pernicious weeds. A notable example is the lantana (*Lantana camara*) which was introduced many years ago for the decorative value of its flowers. The seeds are scattered by the introduced myna bird and the bushes now occupy large areas of land thus destroying its usefulness for grazing or other purposes. Strenuous and more or less successful efforts have been made by entomologists and botanists to introduce natural insect or fungous enemies in an attempt to control or destroy the plants. Another introduced plant which has spread and become a nuisance as a weed in pas-

ture lands is the lemon guava (*Psidium guajava*). Both the guava and the lantana form dense and almost impenetrable shrubby thickets.

There are few native Hawaiian plants that are useful for decorative landscaping purposes which succeed under the unnatural conditions of cultivation. Through the efforts of various individuals and organizations hundreds of species of tropical and subtropical plants useful for their ornamental or other economic value have been introduced during the last fifty years. These plants have been widely distributed throughout the islands where they have been planted in profusion about dwellings and along the streets. Advertising billboards have been banned from the roadsides and in their stead beautiful flowering trees and shrubs have been planted. Honolulu is indeed "a city built in a botanical garden," but the same could be truthfully said of practically every community in the islands. The streets, parks and private gardens present a year-round profusion of varicolored foliage and blossoms on hundreds of varieties of exotic plants. While there is an ever-present abundance of flowers throughout the year, the finest display comes during the spring and summer months. It is then that the avenues and gardens put on a most gorgeous exhibition of flowering trees and shrubs probably equalled nowhere else in the world. To enumerate the different species that one finds on a ramble through the parks and gardens or along the streets of Honolulu would result in a list of a very large number of the tropical and subtropical species worthy of cultivation.

Among the most abundant and conspicuous of the flowering trees are the purple jacaranda, the several varieties of shower trees (Cassias) with pink, pink and white, or yellow flowers; the scarlet flame tree (*Delonix regia*) and African tulip trees (*Spathoda campanulata*), the broad umbrella-shaped monkey pod tree (*Samanea saman*) with its delicate pink blossoms, and the yellow-flowered be-still tree (*Thevetia nereifolia*). Of the shrubby plants the more common are the pink and the white oleanders (*Nerium oleander*), the Plumerias with their pink or white star-shaped flowers, the yellow candle bush (*Cassia alata*), the scarlet Ixora, hundreds of forms of hibiscus, the scarlet and yellow Poinsettias, and the christmas-berry trees (*Schinus terebinthifolius*) with their red berries. Over walls and trellises or trees clam-

ber the fragrant yellow Allamanda, the various shades of perpetually blooming bougainvilleas, the yellow cup-of-gold (*Solandra guttata*), the pink Mexican creeper (*Antigonon leptopus*), the night-blooming cereus, and many others of great beauty. A number of different species are employed for hedge plants. The hibiscus, a great variety of the variegated-leaved Codiaeums and the perpendicularly branched Nothopanax are among the favorites, but hedges of the *ti* (*Cordyline*), Poinsettia, crown of thorns (*Euphorbia splendens*), and Phyllanthus are not unusual. Palms of many species are used in great profusion. Several fine avenues of the stately royal palm are to be seen in Honolulu, while the coconut palm is to be seen everywhere.

Many species useful for reforestration purposes, protection of water-sheds and for windbreaks have been planted including the Australian beefwood (*Casuarina equisetifolia*) and several varieties of Eucalyptus. The beefwood is also used to some extent as a street tree, where it appears to thrive well. The genus Ficus is represented by a large number of species including many fine specimens of the Indian banyan (*Ficus indica*) and peepul trees (*Ficus religiosa*). Many unusual and curious trees such as the Baobab tree, the African sausage tree (Kigelia), and others may be seen.

One of the introduced trees which has been of enormous value to the islands is the Kiawe or Algaroba (*Prosopis chilensis*). This plant which becomes a tree fifty to sixty feet high in Hawaii is erroneously believed to be the same species as the Mesquite of southwestern America. The tree propagates itself with ease and has spread throughout the islands where it has reclaimed and now almost exclusively occupies thousands of acres of rocky, formerly mostly waste lands near the coast. The trees if properly trimmed develop into picturesque shade trees. A large number are used for this purpose on the grounds of the Kamehameha schools in Honolulu. The wood is of good quality and is used for fuel. The pods which are produced in abundance have considerable food value and are relished by horses, cattle and hogs. A large amount of an excellent grade of algaroba honey is also produced.

De Pauw University, Greencastle, Ind.

Fruiting relations of some Mycetozoa

Robertson Pratt

Biological literature is rich in studies of the mycetozoa, or the so-called slime molds. Accounts of their life histories and habits are to be found in zoological as well as in botanical publications, since some zoologists maintain that these organisms should be classed with the protozoa. Most of the literature, however, is found in botanical papers, and as Arthur Lister has pointed out, their study has usually been associated with that of fungi. The term "mycetozoa," which is descriptive of the principal characteristics of these organisms, was introduced by DeBary (1860) as a designation for the group.

The present report is intended merely as a brief note on the substrata on which some of these myxomycetes are found when fruiting in the field. Therefore a complete review of the mycetozoan literature is unnecessary. For a resumé of the literature concerning these organisms the reader is referred to A. Lister's monograph (1925).

Usually when authors describing slime molds have mentioned the type of substratum on which the fruiting structures are found, they have been content to describe it merely as dead wood, dead leaves, or dead herbaceous stems; or they have used some other terse phrase equally indefinite. In some instances the description has been more specific in that the kind of wood or leaf is mentioned. Possibly in some cases there is a definite association between the fruiting condition of a slime mold and a particular species of wood or leaf. Observations in the field, indicate, however, that for many species of mycetozoa the texture of the substratum on which they fruit is more constant than the species of the substratum. This would seem to indicate that the moisture content of the substratum, rather than the species, determines whether or not a particular location is suitable for the fruiting of a given myxomycete. For example, some species of the elegant *Stemonitis* apparently require a situation which is not too wet. They are found most frequently in more or less exposed situations, raised somewhat above ground level, and therefore not exceedingly wet. The writer has found *Stemonitis fusca* on bare rock, on bracket fungi, and on fairly dry pieces

of wood; *Stemonitis ferruginea* has been found on dry leaves of oak and beech and on moderately dry dead twigs of hemlock. These forms, when ready to fruit, appear to seek not some particular species of wood or leaf but rather some particular conditions, probably of moisture and possibly of light also.

Gulielma Lister's brief accounts (1922, 1926) of the mycetozoa collected on two trips of the British Mycological Society, Hadden's (1921) record of mycetozoa at Porlock, and Hagelstein's (1929, 1930) short notes give one some idea of the moisture conditions and of the texture of the substrata on which the specimens were found. Such descriptive accounts of the substrata, however, are not numerous.

There may well be a more or less close connection between vegetative stages of different species of mycetozoa and specific kinds of wood or leaves on which they occur, since it is entirely conceivable that different species may differ in their nutritional requirements. But such seems not to be the case with the sporangia. *Didymium nigripes*, *Leocarpus fragilis*, *Hemitrichia vesparium*, and *Arcyria denudata* are forms which are very constant in the moisture conditions of the substrata on which they occur, but each of these forms appears on a variety of species. The first three species seem to prefer relatively sound tissues, while the last one is found on less sound tissues and frequently on wood which has disintegrated so much that it is almost earth. This indicates that either the moisture requirement or the moisture tolerance of *Arcyria denudata* is higher than that of the other forms mentioned.

Most general accounts of the life histories of mycetozoa state that at the time of sporangium formation the plasmodium seeks the light and a comparatively dry situation. These two requisites are manifestly unimportant for some forms, since their sporangia are frequently situated in the interior of rotting logs where obviously the light conditions, and in all probability the moisture content, do not change appreciably during the time required to complete the life cycle. At least one species of *Lamproderma* (*L. violaceum*) and at least one species of *Hemitrichia* (*H. serpula*) are sometimes found in such situations. On the other hand, a large number of forms seem to require different conditions for fruiting and for vegetative activities. Apparently very different conditions of moisture are tolerated by various

mycetozoa in the sporangial stage. Most of the common species of this region can be placed in one of three groups, as follows:

Group I.[1] Forms with sporangia which occur mostly on relatively firm to hard and sound wood or dry leaves (including needles of gymnosperms) or both, indicating that they require relatively dry situations.

Group II.[1] Forms with sporaniga which occur mostly on relatively soft to disintegrating wood or wet decaying leaves (including needles of gymnosperms) or both, indicating a preference for, or a tolerance of, situations somewhat wetter than those of group I.

Group III. Forms with sporangia which seem to be equally tolerant of either situation and occur about equally distributed on both types of substratum.

These groups seem to be, for the most part, fairly definite and constant. Occasionally, however, an exception is noted and a form which commonly appears in situations characteristic of group I is found in one characteristic of group II and vice versa.

Columbia University, New York, N. Y.

Literature Cited

Bary, H. A. de 1860. Die Mycetozoen. Zeit. f. wissensch. Zoologie **10:** 88–175.

Hadden, N. G. 1921. Mycetozoa at Porlock in October 1920. British Mycol. Soc. Trans. 7: 13–16.

Hagelstein, R. 1929. New mycetozoa from Long Island. Mycologia **21:** 297–299.

———. 1930. Mycetozoa from Jones Beach State Park. Mycologia **22:** 256–262.

Lister, Arthur 1925. A monograph of the mycetozoa. (Third edition, revised by G. Lister.) Oxford University Press.

Lister, Gulielma 1922. List of mycetozoa found during the Worcester foray. British Mycol. Soc. Trans. **8:** 8–9.

———. 1926. Mycetozoa found during the Bettws-y-coed foray. British Mycol. Soc. Trans. **10:** 240–242.

[1] Only wood and foliar structures are listed, as they are by far the most common substrata. Stones, moderately dry nut shells, moss plants, bracket fungi, herbaceous stems, etc., should be included in group I; wet mosses, decaying nut shells, bracket fungi, herbaceous stems, etc., should be included in group II.

Some notes on plants of Trans-pecos Texas

C. H. Mueller

During the summers of 1931, 1932, and 1933 the author collected plants in the Chisos Mountains of Western Texas over a total period of about six months. In the course of that time certain problems suggested themselves. The larger of these will be dealt with later as time permits, and only some minor ones will be given consideration here.

An abundant collection of *Fraxinus Greggii* Gray yielded such wide variation as to have caused a part of it to be identified as *F. nummularis* Jones. Standley in "Trees and Shrubs of Mexico"[1] allows *F. nummularis* specific rank but very pointedly suggests that it is but a form of *F. Greggii* bearing a reduced number of leaflets. The author's collections in Western Texas definitely bear out Mr. Standley's contention.

Fraxinus Greggii Gray (Proc. Am. Acad. 12: 63. 1877) is described in part as follows: "leaflets usually 5 or 7, . . . obtuse, glabrous, . . ."[2] and, "leaflets 3 to 7, from narrowly spatulate to oblong-obovate, obtuse, obtusely few-toothed or entire, firm coriaceous, . . ."[3] *F. nummularis* Jones (Contr. West. Bot. 12: 59. 1908), "leaves mostly simple but sometimes trifoliate, the simple leaves oblanceolate to oval, . . . obtuse, glabrous, subcoriaceous."[4]

Plants were noted in the Chisos Mountains which fitted well each of these two descriptions, but there were also individuals which exhibited simple, trifoliate, and 5- and 7-foliate leaves all on the same main branch. This was repeatedly observed and is here cited as proof that *F. nummularis* Jones is merely a form of *F. Greggii* Gray.

A series of specimens illustrating this relationship is preserved in the author's personal herbarium at Cuero, Texas.

Phlox mesoleuca Greene is commonly scattered on the less wooded slopes of the Chisos Mountains from 5500 to 7000 feet

[1] Contr. Nat. Herb. **23:** 1135.
[2] Ibid., p. 1134
[3] Contr. Nat. Herb. **2:** 259.
[4] Contr. Nat. Herb. **23:** 1135.

altitude. On one cutover slope there was collected in 1931 and 1933 an albino form which differs from the type only in its white corolla and a somewhat greater robustness.

Phlox mesoleuca Greene f. **alba** f. nov. Leaves usually larger (as long as 5.5 cm.), darker green, and more hirsute than the type; corolla as wide as 3.8 cm. across and without a hint of the typical rose coloration.

Type specimens (Mueller no. 554) collected August 23, 1933 are preserved in the Field Museum of Natural History at Chicago, Illinois and in the author's herbarium at Cuero, Texas.

In a recent paper describing *Talinum Youngae* (Torreya 33: 148) the author unfortunately overlooked the close affinity of the species for *T. pulchellum* Woot. & Standl., a species known only from the type locality at Queen, New Mexico. *T. Youngae* and *T. pulchellum* may be distinguished by the singly disposed flowers of the latter on pedicels 1 cm. long in the axils of the leaves as opposed to the usually 3-flowered cymes of *T. Youngae* about 3 cm. long in the axils of the branches or terminal.

It was suggested at the time of its description that *T. Youngae* was closest related to *T. calycinum* Engelm. It seems, however, that *T. Youngae* and *T. pulchellum* form a natural group as do *T. calycinum* and *T. parviflorum* HBK. They may be distinguished as follows:

Inflorescence much elongated (rarely shorter than 10 cm.; usually about 20 cm.); leaves terete..*T. calycinum*, *T. parviflorum*.

Inflorescence short (rarely 4 cm. long); leaves flattish.

Flowers solitary in the axils of the leaves on pedicels about 1 cm. long grouped near the top of the stem and hardly surpassing the leaves....*T. pulchellum*.

Flowers usually 3 in cymes in the axils of the branches or terminal, considerably surpassing the leaves but rarely 4 cm. long...................*T. Youngae*.

University of Texas
Austin, Tex.

What is a binomial? What is a forma?

T. D. A. Cockerell

In the excellent revision of *Halenia*, by Dr. Caroline K. Allen, lately published by the Missouri Botanical Garden, I find the names *Halenia Mayeri Johannis* and *H. taruga gasso*. These, from Gilg. 1916, are given without protest or comment; they represent valid species from Ecuador. Such names are neither binomials nor trinomials, and it seems to me that if any one cared to propose entirely new names for these plants, such names would be valid. However, we may better stretch a point and assume that the use of the hyphen was implied, calling the plants *Halenia meyeri-johannis* and *H. taruga-gasso* respectively. Another question raised by the Halenia revision has to do with the use of the term "forma." Botanists transfer plants from the status of "varieties" to "forma," and call the result a "new combination." But actually the conceptions underlying the use of these terms are vague and confused. *Halenia plantaginea* f. *grandiflora* has large flowers, and it is said of it that it "appears to be only a variation, due merely to habitat, moisture or some nutritional factor." Whether this is the case, may perhaps be doubted, but if so this "forma" is quite different biologically from such a thing as a "forma *albiflora*" of any species, which is a mutation existing under the same conditions as the type form. It would clarify the subject to use the term mutation (mut.), but probably "forma" is now so well established that it must be retained. Peculiarities due entirely to environmental conditions acting on the individual plant really have no taxonomic basis, but sometimes it may be practically useful to refer to them by name. In such cases, perhaps the term phase (ph.) would be acceptable. When the plants from a special environment all show some special features, it is no doubt best to treat the segregates as subspecies, in spite of the possibility that some future experiments may show them to be nothing more than phases due to conditions of life. Sometimes, however, known analogies are sufficiently convincing to determine the treatment.

Boulder, Colo.

A new record for Leptomitus from Alaska

George S. Tulloch

The purpose of this paper is to report an extension of the geographic range of *Leptomitus lacteus* (Roth) Agardh. to Alaska and to describe its habitat in this region of the world.

During July 1931 masses of a fibrous, grayish and slimy substance were collected around placer mining operations along Goldstream Creek near Fox, Alaska (64°55′ north latitude, 148°41′ west longitude). This material was identified as *Leptomitus lacteus*. Later this identification was verified by Dr. Arthur Kevorkian and Professor W. C. Coker. More recently Dr. Kevorkian has studied the zoospore formation in this Alaskan material. The results of his investigations will appear shortly under the title of *Studies in the Leptomitaceae*.

This occurrence of *Leptomitus lacteus* within one hundred miles of the Arctic Circle is a new location which is considerably farther north than any of the previously reported cases. It has been collected many times throughout Europe and North America, yet no northern location has been recorded which is comparable to this record from Alaska. As examples of its northern distribution in North America there are the records of Humphrey (1893) from Massachusetts and Connecticut and those of Kevorkian (unpublished) from Massachusetts and Rhode Island. In Europe it has been collected in many places; the records of Corny (1872) and Radais (1898) from France, Kolkwitz (1903), Tiegs (1919) and Amelung (1931) from Germany, and Petersen (1911) are cited as examples of its distribution there. The records from Denmark appear to be the most northern of those found in the literature but even these are in a general latitude about ten degrees south of the Alaskan location.

Leptomitus lacteus is one of the Leptomitales which are commonly referred to as water moulds. In general the fungi of this order are more or less abundant in all fresh waters, preferring waters which are clear and relatively pure. *Leptomitus lacteus*, however differs rather strikingly from the other members of its group in preferring a habitat containing large amounts of organic substances such as the slime from sewers or in sewage-contaminated streams. It has also been reported from drains of

breweries, sugar factories, paper mills, etc. Coker (1923) in North Carolina reports that, "we have found the plant in Chapel Hill not only in sewers but also rarely in such clean streams as Battles' brook and the brook behind the athletic field." Kevorkian (unpublished) on one occasion has collected this form in clean streams in Arlington, Massachusetts.

The conditions under which *Leptomitus* was found along Goldstream Creek, Alaska appear to agree generally with the majority of the previously reported cases. Although the water contained no sewage or similar materials, organic substances of another type were present in large quantities. It is in the floors of the valleys of Central Alaska that the topsoil consists of muck (peat) varying from a few feet to over one hundred feet in thickness. The collection of *Leptomitus* reported above was made in water containing large amount of suspended muck, and presumably there were sufficient organic substances present in solution to allow the plant to grow and develop.

Literature Cited

Amelung, H. 1931. Chem. Zeit. **41**: 394.
Coker, W. C. 1923. Univ. of N. C. Press.
Corny, M. 1872. Ann. Sci. Nat. Bot. Series (5) **15**: 5.
Humphrey, J. E. 1893. Trans. Am. Phil. Soc. **17**: 63–148.
Kolkwitz, R. 1903. Ber. der Deut. Bot. Ges. **21**: 147–150.
Petersen, H. E. 1911. Ann. Myc. **8**: 499.
Radais, M. 1898. Bull. Soc. Myc. France **14**: 144.
Tiegs, E. 1919. Ber. der Deut. Bot. Ges. **37**: 496–501.

Brooklyn College, Brooklyn, N.Y.

A new Cirsium from South Dakota

George E. Osterhout

Cirsium coccinatum sp. nov.

A perennial 5–8 dm. high, the stem lightly flocose at the time of flowering: the leaves lanceolate in outline, 2–2½ dm. long, pinnately lobed, the lower leaves lobed more than half way to the midrib, the upper leaves completely so, green and slightly tomentose on both sides, the lobes linear or narrowly ovate, rather remotely spiny, and tipped with a spine 5 mm. long; heads few, large, terminating the stem and short branches, with purple flowers; the involucre about 4 cm. high, 4–5 cm. wide, with one or more narrow leaf-like bracts at the base; the bracts all upright, glabrous, imbricated in 4 or 5 successive lengths, ovate lanceolate, the outer ones 10–12 mm. long, tapering into a small weak spine, the inner ones ending in scarious, twisted tips; the pappus white, of slender bristles about 4 cm. long, only remotely plumose at the base.

Cirsium coccinatum sp. nov.

Perenne 5–8 dm. altum; folia lanceolata 20–25 cm. longa pinnatiloba, suprema usque ad costam lobata, utrinque parce tomentosa, remote spinosa, ad apicem aculeo 5 mm. longo notata; capitulis paucis purpureis; involucri 4 cm. alti 4–5 cm. lati, bracteae glabrae 4–5-seriatim imbricatae, ovato-lanceolatae, exteriores 10–12 mm. longae in aculeum debilem angustatae, interiores apice contortae scariosae; pappi albi pili basi remote plumosi circa 4 cm. longi.

Collected by the writer near Hill City, Black Hills, So. Dak. July 12, 1932, No. 7826.

Windsor, Colorado

Another Aeschynomene Rust

J. C. Arthur

A specimen of rust worth special attention has been received by the writer from Dr. J. J. Davis of the University of Wisconsin. It was collected by A. L. Smith at Crowley, in southern Louisiana, on *Aeschynomene virginica* (L.) B.S.P., August 9, 1932. It may be described as follows:

Uredo posita J. J. Davis n. sp. Uredia caulicola, sparsa, pallida cinnamomeo-brunnea; urediosporae globosae vel obovatae, 17–21 × 19–23μ; episporio 1.5–2μ cr., echinulatae, poris germ. 2, superequatorialibus.

The urediospores are somewhat flattened laterally and bear a pore on the flattened sides near the apex. The sorus is without a peridium. It is evidently a species belonging to the Pucciniaceae. The only other species on this genus of hosts, but not on *A. virginica*, is *Uredo Aeschynomenes*, found in Mexico, the West Indies and South America. It is very distinct, having imbricated paraphyses, and apparently belongs to the Melampsoraceae.

Purdue University, Lafayette, Ind.

A Tertiary Ephedra, a correction

In the January-February number of Torreya a fossil Ephedra was described by Dr. R. P. Woodehouse. Due to an error in an addition to the page proof the name of the new species was omitted. The species name was given only under the cut of the fossil, it should have appeared before the description on page 1 as **Ephedra miocenia** sp. nov.

FIELD TRIPS OF THE CLUB

On November 12th ten members of the Club met the leader in Pleasantville, N.Y. and hiked up the unfinished Sawmill River Parkway where the remains of many fall weeds were identified by fruits, withered inflorescences and leaves, or characteristic branching. Half way to Chappaqua we left the parkway and scrambled up Flag Hill for a wonderful view of all Westchester County, more or less. After a pause here for lunch in the shelter of some rocks we continued northward, cross country, along a road, and through woods, thus covering a variety of territory. Occasional specimens of the following flowers were found in bloom even at this late date: violet, *Lobelia inflata*, yarrow, golden-rod, aster, dandelion, and witch-hazel; and with these reminders of earlier fall, the promise of spring was impressed upon us by the finding of shoots of skunk cabbage two to three inches high. Another thing worth reflecting upon was a wild cherry which had many vigorous sucker shoots. The leaves on these shoots were unhurt by frost while practically all other trees had long since lost their leaves. They were evidently young shoots which had made their growth late in the summer. Leaves of this age might be expected to lack an abscission layer and thus remain on the tree longer, but their resistance to frost seemed quite surprising.

Harold H. Clum

Opening of the 1934 Field Meetings

Lincoln's Birthday, Monday, February 12

Winter botany brought a party of twenty-four on the morning of February 12 to the museum building of the Botanical Garden where part of the time was spent in the examination of a varied collection of twigs. Attention was called to the various types of buds to be looked for and to their arrangement, size, color, and number of scales. How to judge a flower bud on species that show them in the winter condition was also shown.

This embraced cultivated, as well as native, woody plants to be seen on a stroll through the Bronx Park region. A member of the Field Committee kindly sent us a specimen of *Dirca*

palustris from New Jersey, and a request was made that members on trips within the range of the Club report the finding of this shrub which is rare in our vicinity. As usual in mid-winter, *Hamamelis mollis*, *H. japonica*, *H. vernalis*, and *Salix gracilistyla* were in bloom on the grounds of the Botanical Garden.

A brief pause before the unique exhibit of aquatic plants led to recognition by the party of various familiar plants of our region, viz:—*Lysimachia Nummularia*, *Peltandra virginica*, *Brasenia Schreberi* and a *Sphagnum* masquerading as a submerged species! *Elodea canadensis*, now properly known as *Anacharis*, various *Potamogetons*, *Ceratophyllum demersum*, *Utricularia vulgaris*, *Najas flexilis*, *Proserpinaca pectinata*, *Lemna minor*, etc., were of interest.

Fontinalis antipyretica, one of the common species of water moss and doing particularly well, growing from a small rock, and a *Marsilea* species, attracted attention.

Perhaps the most fascinating plant was *Vallisneria spiralis*, in flower, the exaggerated scapes of the fertile flower showing distinctly the coiled condition which occurs only after fertilization has taken place. This is the plant so much sought after by various ducks which feed upon its roots and tender shoots, particularly in our lakes and southern marshes.

The canvasback has earned the title of the most celebrated of American ducks for the epicure, due to its being fattened on the wild celery. "Eel Grass" is another name for this same species, but should not be confused with *Zostera marina* which is strictly limited to brackish waters, particularly tidal inlets.

A visit to the Zoological Garden followed. Due to zero weather preceeding this day's trip, Agassiz Lake and the Wild Fowl Pond were tightly frozen, save for a small area close at hand, thus enabling us to study birds of the wild to our entire satisfaction. About 800 black ducks, many evidently the red-legged black duck, were lazily enjoying the day. Baldpates, pintails, one female hooded merganser, a pair of green-winged teal and a male European teal helped to enliven the scene.

Within the confines of the bird house were seen a number of native birds, and through the kindness of Mr. Samuel Stacey, head keeper of the bird department, we were privileged to have an intimate glimpse of the daily bird life there represented. The extraordinary intelligence of certain species, the ready

response to the advance of Mr. Stacey, with his unlimited store of patience and knowledge of the care of the caged bird led us past the luncheon hour. Here, indeed, is the ideal place to transport oneself on a wintry day!

A visit to the kinkajou, the odd mammal belonging to the family including our racoons, demonstrated again the response to man's kindness on the part of one of Nature's arboreal creatures, this individual being especially docile.

Some of the group continued through the early afternoon over a part of the Botanical Garden viewing the winter silhouette of trees, returning for a collection of twigs to be used in classrooms.

HELENE LUNT

BUCKBERG AND CEDAR POND BROOK

February 17, 1934

The south sides of the hills had melted fairly clear of previous heavy snows, and the temperature had risen to about freezing, from previous zero marks, on the field trip of the club on Sunday, Feb. 17, from Tomkins Cove, over Buckberg Mountain, south through Rosetown, to Cedar Pond Brook and down along its gorge to Stony Point.

Lichens were the most obvious plants under the conditions. Several Cladoniae were found, including *papillaria*, *cristatella*, f. *vestita; subcariosa*, *mitrula*, *caespiticia* and *tenuis*. Old walls at the top of the steps leading from Tomkins Cove station to the state highway were encrusted with *Candelariella vitellina* and *Caloplaca aurantiaca*. The unusual colony of the limestone fern *Pellaea atropurpurea*, on lime mortar in the cracks of a granite wall, seemed to be increasing.

The western extension of the Cortlandt series of rocks (typically displayed on Blue Mountain and Spitzenberg on the other side of the Hudson) in Rosetown, southwest of Tomkins Cove, was studied, in outcrops in the fields, and in the ancient stone walls. Its most conspicuous member is a hornblendic rock, with much black hornblende in streaks and large isolated crystals. It seems to be favored by *Caloplaca aurantiaca*. Handsome, zonate-edged colonies of *Lecanora cinerea* grew on smooth granite glaciated cobbles in the walls.

Lythrum Salicaria is established in the swampy spots back of Tomkins Cove and Stony Point in dense colonies.

The gorge of Cedar Pond Brook, from the site of the former Flora's Falls, now covered by the dam of the reservoir of the Haverstraw Water Company, down under the high bridge on State Highway 9-W to the salt marshes between Stony Point and Grassy Point is very interesting, even when covered with snow and ice, which obscured the lichens and liverworts we hoped to find. We shall make another trip there in summer when conditions are better for closer studies. Flora's Falls was the location of a rare species of the gelatinous lichen *Collema*, reported by Austin to Tuckerman, sixty years ago, and named *C. myriococcum* in Tuckerman's book. As this is a lime loving species, we thought it might be found on the limestone pebbles in the limestone-sandstone conglomerate, a border formation of the Triassic red sandstones which have their northern extension here, and which is seen in the vertical walls of the gorge just below the dam. But the icy conditions deferred closer examination until summer. The mile or so of gorge, down to the salt meadows, would repay intensive study in open conditions.

South of the Stony Point railroad station, the Great Horsetail, *Equisetum hyemale*, is found as a weed among the ties on a siding. *Equisetum arvense* often grows in such situations, but this is the first time I have seen *E. hyemale* growing in this manner. It evidently spread from a larger colony on the banks of the dissected river terrace, on the north side of Cedar Pond Brook, where it becomes a tidal estuary near the railroad bridge west of Grassy Point.

Color changes in lichens, on application of KOH, were seen on *Xanthoria parietina*, growing on an old elm, turning purple; and *Cladonia subcariosa*, in an old field, turning yellow and finally scarlet.

RAYMOND H. TORREY

THE FIELD TRIP OF FEBRUARY 17 TO THE PALISADES

On Saturday morning, February 17, a party of five walked along the Palisades from the Alpine landing to Forest View. The purpose of the trip was advertised as a study of trees in the winter condition and attention was given to the comparison of the buds of related species of Oak, of Maples, and of the two

Mulberries, the red and the white. Individual trees of each of which were found.

The most interesting feature of the trip, however, came as the result of the loud cawing of a group of crows. In trying to find the cause of the disturbance, a bald eagle was seen. Later this and another eagle were watched flying above the trees close to the cliffs or along the river. One bird crossed to the Yonker's side and soared for some time above the buildings, but returned to the Palisades at last.

In the river there were also a large number of scaup duck, a number of mergansers, and a few other species.

No evidence whatever was found of spring growth among the plants.

George T. Hastings

PROCEEDINGS OF THE CLUB

Meeting of December 20, 1933

The meeting was called to order at The New York Botanical Garden at 3:30 P.M. by President Blakeslee with 35 members present.

The following were unanimously elected to membership in the club: Miss Ellys Butler, 186 Crescent Avenue, Leonia, N.J.; Mr. B. B. Higgins, Georgia Experiment Station, Department of Botany, Experiment, Georgia; Mr. Robert A. Steinberg, Bureau of Plant Industry, U. S. Department of Agriculture, Washington, D.C.

The resignations of Mr. Howard J. Banker, Prof. B. T. Butler, Prof. C. R. Orton, Miss Clara Raska, Dr. Roland C. Geist and Mrs. Samuel W. Weiss were accepted with regret.

Professor M. A. Chrysler of Rutgers University gave an interesting talk on "Alpine Gardens of Europe." This talk was illustrated by lantern slides and specimens.

Forman T. McLean
Secretary

Meeting of January 2, 1934

The meeting was called to order at the American Museum of Natural History at 8:15 P.M. by President Blakeslee. There were 21 members present. The minutes of the meetings of December 5th and December 20th were read and approved.

Prof. P. A. Davies, Dept. of Biology, University of Louisville, Louisville, Kentucky was unanimously elected to membership in the club.

Reports of the Secretary, Treasurer, Editor of the Bulletin and Editor of Torreya were read and approved.

There being no other deferred or new business brought before the meeting, it then proceeded to the election of officers. The list of officers elected is printed on the inside of the cover page of this issue.

Forman T. McLean
Secretary

NEWS NOTES

The Brooklyn Botanic Garden had an unusual exhibit at the International Flower Show. The subject illustrated was *Pruning*, an operation that is peculiarly difficult to demonstrate with "still life," and perhaps for that reason had never been attempted before; but by the ingenious use of colors and placards on living specimens the difficulties had to a large extent been overcome. For a theme of this sort, a considerable amount of planning is necessary for the proper timing of the development of the material; so that months of preliminary work were needed in order to stage an effective display.

A gold medal was awarded the garden for this exhibit. A special prize was also awarded the garden for its exhibit of forty-six varieties and species of Crocus.

In connection with the exhibit, the Garden published a leaflet on *Pruning*, written by Mr. Montague Free and a second one describing the exhibit.

At the Flower Show the New York Botanical Garden had an exhibit of California wild flowers growing in a natural setting. The 125 species of flowers were grown from seed or from bulbs and brought into flowering at the garden. The exhibit was given a special award and also a bronze medal, the latter from the Garden Clubs of America. Another exhibit from the garden showed several species of sundew, one, *Drosera capensis* from South Africa, in blossom.

The Botanical Society of America announces two summer meetings. One will be held at Berkeley, Calif., from June 18 to 23 in connection with the summer meeting of the A.A.A.S. Professor R. M. Holman of the University of California, Berkeley, is in charge of the program. The other meeting will be held at Toronto, Canada, from June 18 to 20 and arrangements are being made by Professor R. B. Thomson of the University of Toronto. The important feature of this meeting will be a two-day field trip to Bruce Peninsula, Georgian Bay.

Dr. John Wishart of the University of Cambridge plans to visit the United States in July and August on his way to China, where he will lecture and advise regarding experimental plant breeding at the University of Nanking.

Mr. Montague Free, of the Brooklyn Botanic Garden, has been elected president of newly-formed American Rock Garden Association.

Dr. Elton H. Eaton died in Geneva, N. Y. on March 27th in his sixty-seventh year. Dr. Eaton was best known as an ornithologist, but he was also an authority on local botany. He was the author of the two volumes "Birds of New York" and of the "Biological Survey of the Finger Lakes."

Mr. B. A. Krukoff has returned from his fourth expedition into Brazilian Amazonia with about 17,000 herbarium specimens and a very large collection of Brazilian woods. The botanical specimens are now being prepared at the New York Botanical Garden for distribution to the leading botanical institutions of the world, while the wood specimens will be studied at the New York State College of Forestry and duplicate material distributed from there. Mr. Krukoff travelled during this expedition into parts of South America which have not been hitherto explored by a botanist and have rarely been visited by white men.

Ascending the Jurua River almost to the Peruvian boundary, he turned south up one of its tributaries and collected many specimens near the mouth of the Embira. From this point he continued overland farther south across a plateau to a tributary of the Purus River where other large collections were made. Thence he descended the Purus River to the mouth of the Ituxi River, ascended it south to its source and again travelled overland to a tributary of the Madeira. His trip home followed the familiar route down the Madeira and the Amazon to Para.

While the scientific study of the botanical specimens has not yet begun, preliminary examination indicates that the collection contains numerous species of great botanical interest.

A magnificent collection of botanical material from British New Guinea with ample field notes and many duplicates has just been received at the New York Botanical Garden. The specimens were prepared by Mr. L. J. Brass, botanist with the Richard Archbold ornithological expedition of The American Museum of Natural History in 1933. There are about 2,100 numbers in the series which forms one of the largest and most

valuable collections of plant material ever made in British New Guinea. The specimens are largely from the forested areas, up to an altitude of about 12,000 feet. Between 10 and 15 per cent of the numbers represent ferns and fern allies. Identifications will be made by E. D. Merrill with the assistance of specialists.

The extensive Kenya, Uganda and Belgian Congo botanical collections made by Dr. James P. Chapin of The American Museum of Natural History 1926-31 have recently been submitted to The New York Botanical Garden for study and incorporation in its reference collections.

A census of the Herbarium of The New York Botanical Garden recently completed through the utilization of temporary employees assigned to the Garden by the Emergency Work Bureau shows a total of 1,706,348 specimens in the herbarium at the end of 1933; of these 58,606 are assembled at the local herbarium, representing plants growing within 150 miles of New York City, and are thus available for the use of all students interested in a study of the local flora.

Dr. Tracy E. Hazen, president of the Torrey Club, sailed for Puerto Rico on March 29, where he is spending a portion of his sabbatical leave in making confirmatory studies on an unpublished filamentous alga which he first brought to the attention of the Club in the autumn of 1914. He expects to return to New York before the end of April in order to make further investigations on the chrysophycean genus *Tetrasporopsis*, upon which he made a preliminary report a year and a half ago, and which was again found in the local flora last spring.

The first award of $250 of the George W. Carpenter Fund for encouragement of scientific research has been made by the Academy of Natural Sciences of Philadelphia to Dr. Francis W. Pennell, curator of botany for his work on the Snapdragon family of eastern North America. This fund will permit publication of Dr. Pennell's book on the subject. The George W. Carpenter Fund is a bequest from the late Mrs. Ellen D. C. Bennett, in memory of her father, one of the earliest members of the academy, who served as treasurer of the institution from 1826 to his death in 1880.

The "Mangareva Expedition" has been organized by the

B. P. Bishop Museum for conduction studies of ethnology and natural history in the little-known parts of southeastern Polynesia. The chief purpose of the expedition is to record data regarding native races, flora and land fauna, which are disappearing at a surprisingly rapid rate. Incidental observations on geology, marine zoology and general oceanography will also be made. The scientific staff includes Dr. Peter H. Buck, Kenneth P. Emory and J. Frank Stimson, ethnologists; Professor Harold St. John and Raymond Fosberg, botanists; Dr. C. Montague Cooke, Jr., and Donald Anderson, malacologists, and E. C. Zimmerman, field entomologist. Dr. C. Montague Cooke, Jr., has been appointed leader of the expedition.

The Brooklyn Botanic Garden has just completed the Laboratory Plaza with the placing of a commerative plaque on one of the concrete posts at the entrance. A bronze armillary sphere has also been installed in the center of the area. This is mounted on a pedestal of black granite and is composed of circular bands of bronze representing the principal celestial circles and the ecliptic of the earth's orbit. A metal rod extending from the south to the north pole casts a shadow so that the sphere serves as a sun dial. A bronze band on the pedestal bears the motto:

Serene I stand amyddst ye flowres
To tell ye passing of ye howres.

Mrs. Elizabeth Gertrude Britton (Mrs. Nathaniel Lord Britton) died at her home in New York on the twenty-fifth of February. Mrs. Britton had been a member of the Torrey Botanical Club for over fifty-four years, during which time she did much to direct the policies and activities of the club. She was a leading authority on American mosses and one of the organizers of the Wild Flower Preservation Society of America. For many years she was secretary and treasurer of the Wild Flower Preservation Society and did much to stimulate the ideals of conservation. Her influence will continue to be felt both in the club and among lovers of wild flowers for years to come.

THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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100 "	2.47	4.18	5.88	6.98	9.07	10.78	12.60	13.69	19.30	24.25
150 "	2.97	5.06	7.15	8.36	11.22	13.31	15.62	16.72	23.48	29.48
200 "	3.85	5.55	7.86	9.18	12.44	14.85	17.38	18.53	25.90	32.56
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Committees for 1933

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 60, published in 1933, contained 682 pages of text and 32 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.

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TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR
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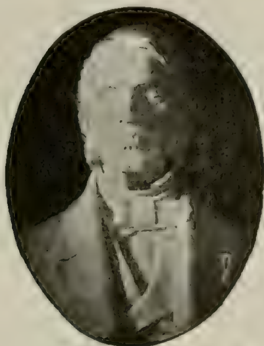
BY
GEORGE T. HASTINGS



John Torrey, 1796-1873

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MEMBERSHIP

All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100.; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications.

Meetings of the Club are held on the first Tuesday of each month at the American Museum of Natural History, New York City, and on the third Wednesday at the New York Botanical Garden.

Torreya is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, thirty cents. To subscribers elsewhere, twenty-five cents extra, or the equivalent thereof. Postal or express money orders and drafts or personal checks on banks are accepted in payment. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. All subscriptions and other communications relating to the business of the club should be addressed to 450 Ahnaip Street, Menasha, Wisconsin, or to the Treasurer, Mrs. R. A. Harper (Mail address—Schermerhorn Hall, Columbia University, New York City).

Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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Cladoniae of the North Woods

Raymond H. Torrey

This paper is an extension of an earlier article, "Cladoniae of the Range of the Torrey Botanical Club," published in the September-October, 1933 number of Torreya. It covers species found by the writer, or received from friends who kindly volunteered to collect them, in the Adirondacks, Vermont, New Hampshire, Maine, and Gaspé, in eastern Quebec. It also includes some species listed in books and papers which will be cited, but which were not seen nor received by the writer, but are listed to suggest that they be looked for in favorable locations in the region here covered.

This paper includes many of the species, described in the earlier paper, which extend their ranges into the more northern regions here covered, but, since they were described, and in many cases pictured, in the earlier paper, they are noted in less detail here, in order to save space for a more complete record of species that may be sought in the North Woods. Readers are referred to the key and habitat notes of the earlier paper, and to the authorities there cited for more detailed descriptions.

The three plates at the end of this paper are devoted largely to North Woods species, except a few, where the strikingly robust character of species common to both regions, but larger in the north, seemed to warrant inclusion in the illustrations.

This paper is intended, like the earlier one, as the contribution of an amateur student of lichens to beginners like himself, and may perhaps be of particular use to nature councillors in summer camps in the North Woods, who may include lichens in their educational work, under the stimulus of recent papers on Cladoniae, by experts, in botanical journals, which have aroused new interest among amateur botanists in this hitherto relatively neglected class of plants. Teachers, students, walkers

and climbers interested in botany, whose vacations take them into the North Woods, will find there many species of Cladoniae which are absent or rare in the range of the Club within 100 miles of New York City. Some of these northern species are strikingly tall and robust, compared with those of lower latitudes, and others are extreme in their fantastic and intricate forms of branching.

Thanks are due to the friends who volunteered to collect and send to the writer ample specimens, found on their vacation trips, in the North Woods. Specimens from Gaspé, Quebec, along the north shore and in the Gaspé National Forest, near the Federal Zinc and Lead Mine, 48 miles inland from the Bay of Chaleur on the south shore, and from Maine and New Hampshire, were collected by the writer; on a trip made possible by Mr. Alexander Jessup, who supplied transportation in his automobile; and in the Adirondacks, through similar helpfulness by Mr. LeRoy E. Kimball. Those who sent specimens were as follows:

Mr. George F. Dillman, from Schroon Lake, Santanoni Mountain, Hurricane Mountain and Mount McIntyre, in the Adirondacks; Mr. Archibald F. Shorey, from the Great Range and Cranberry Lake, in the Adirondacks; Mr. John W. Thomson, Jr., from western Maine; Mr. Frederick K. Vreeland, from South Pond, near Long Lake, and Blue Mountain, in the Adirondacks; Mr. Vincent Schaefer, of Schenectady, N. Y. from Panther Gorge on Mount Marcy, Adirondacks; Mr. Myron H. Avery and Dr. J. F. Schairer, of Washington, D. C. from Mount Katahdin and Chairback Mountain, northern Maine; Mr. E. H. Walker, of the Smithsonian Institution, Washington, D. C., from Mount Washington, N. H.; Mr. M. L. Joslin, of Burlington, Vt., from Lincoln Mountain, Couching Lion and other Green Mountain summits, in Vermont; and Mrs. Laura Woodward Abbott, of Bristol, Pa., from Jay Peak, Vermont.

Acknowledgments are again due to Dr. Alexander W. Evans, of the Osborn Botanical Laboratory, Yale University, Professor of Botany, for continued helpfulness in the determination of these northern species; and, in some cases, for confirmations or precise determinations by Dr. Heinrich Sandstede, of Bad Zwischenahn, Oldenburg, Germany, to whom Dr. Evans sent

some of the material. Dr. Evans has supplied notes on many stations of species, from specimens in the herbarium in the Osborn Botanical Laboratory, and from other records, establishing their occurrences more widely than was known to this writer, especially of the extension northward of the range of species reported in the paper on the "Cladoniae of the Range of the Torrey Botanical Club."

Use has been made of the authorities cited in the first paper; Prof. Bruce M. Fink's "Lichens of Minnesota;" Prof. Edward Tuckerman's "Synopsis of North American Lichens;" Annie Lorain Smith's "Manual of British Lichens;" Dr. A. W. Evans' "Cladoniae of Connecticut," and the supplement thereto in the July-August, 1932 issue of Rhodora, journal of the New England Botanical Society. Two additional lists of northern Cladoniae, kindly called to our attention by Dr. Evans, have been found very useful in checking species: "Cladoniae from the Valley of the Cap Chat, Gaspé Peninsula, Quebec," by A. F. Allen, in the May, 1930 issue of Rhodora; and part of an article on "Lichens of the Gaspé Peninsula," in the instalment covering the Cladoniae, in the October, 1926 issue of Rhodora, by Dr. C. W. Dodge. These papers will be found very useful by any students of Cladoniae who may be able to reach the higher summits of the Shickshock Mountains in the interior of the peninsula, which has been made more accessible in recent years by the completion of the automobile highway around the north shore, making the region an attractive one for summer vacation botanizing tours.

Dr. Evans has also added to the information of this writer through references from a paper by Merrill, the 12th of his series of Lichen notes, which appeared in the Bryologist, journal of the Sullivant Moss Society, for September, 1909, entitled "The Cladonia specimens of 'Lichenes Boreali-Americani.' "

Many of the species given in the key in this article are not listed in the older American works on lichens, and some of them are not found in any readily accessible reference works, but were identified by Dr. Evans, according to names now generally accepted, from the universal treatment of Cladoniae, by Professor Edward August Vainio, the distinguished Finnish authority, of whose work there are very few copies in this country. The popular treatment here offered may therefore be justified in

order to place a brief, compact and inexpensive means of identification of these northern species, upon characters observable with the naked eye or a hand lens, in the hands of students who are becoming interested in lichens as an extension of general botany, on their rambles and vacation trips.

The distribution of Cladoniae, as observed by this writer, from New Jersey to Gaspé, and from sea level to over 5,000 feet, in the regions in which he has collected, suggests that they are affected by the factors that influenced the migration of vegetation northward after the close of the last period of glaciation in North America, 30,000 to 50,000 years ago. Like alpine and arctic flowering plants, they retreated northward, and in many cases retreated upward to higher elevations in the areas first uncovered by the melting of the ice sheet, where they are now isolated on boreal islands. Northern species, such as *Cladonia deformis*, still remain on some of the higher mountains in the club range, as in the Catskills. Dr. Evans, in his "Cladoniae of Connecticut" reports the collection, in the highest parts of that state, in the northwestern townships in the Taconic mountains, of Cladoniae not found elsewhere in the state, but commoner in northern New England. Many of the species common in the club range appear to be extending into the North Woods, and a recent discovery by the writer, in the Pine Barrens of southern New Jersey, of *Cladonia santensis*, hitherto reported no farther north than Maryland and originally determined from South Carolina on the Santee Canal, suggests a migration of southern forms northward along the coast strip, as occurs with flowering plants. But some of the species here listed from the North Woods have not been reported in the Club range, although they may be left islanded on some of the higher summits of the Blue Ridge or the Great Smokies, above 4,000 feet.

Readers are referred to the earlier paper by the writer, for the morphology of the genus Cladonia, or, for more detail and technical treatment, to the authorities there cited.

Key to Groups and Species

In this key, species listed in the earlier paper by this writer, as of the range of the Torrey Botanical Club, extending only as far north as the Catskills and Taconics, which have been

found by the writer in the northern regions here covered, or sent to him by others, are described briefly to keep the continuity of the systematic arrangement of the genus. Readers are referred to the earlier paper, and to the authorities there cited, for fuller descriptions. Species not listed in the earlier paper are described more fully here. In the photographs at the end of this paper the illustrations are confined to the species not previously pictured, except a few cases where robust forms of the north woods, of species found in the club range, are presented. The list here presented is not a complete one for the region, and many of the species of the club range not found there in or received therefrom, by the writer, doubtless extend northward, and further search would disclose them. Northern species ward along the mountains, probably even south of the Torrey Botanical Club range, and southern, or Middle Atlantic coastal plain species, found in the New Jersey Pine Barrens or on Long Island, probably extend into southern Maine, or perhaps into Nova Scotia, through migration along the now submerged Continental Shelf.

Subgenus 1. **Cladina** (Nyl) Vain. Primary thallus crustaceous, soon disappearing, rarely seen. Podetia slender, one to six inches tall, or taller still farther north; much branched, arachnoid-tomentose, without cortex, or with a close or scattered warty surface of gonidia (tuberculous masses of algal cells); tips of branches with two to eight minute forks, usually brownish; apothecia small, circular, rare, brown. Usually densely branched and entangled, often in large colonies, sometimes two or more species in the same colony. Grayish, grayish-white, or grayish green, or bright green in shade or olive-brown in sun. Commonly known as "Reindeer Mosses."

Podetia in dense, irregularly entangled colonies.
Podetia often polytomous (many-branched) with whorls of three or more branches surrounding gaping axils; outer podetial layers persistent.
Podetia ashy-gray, darker in old plants; or sometimes brownish or greenish; surface arachnoid, KOH +, yellowish.
1. *C. rangiferina*

Podetia yellowish-green, varying to gray, whitish or greenish, more delicate than the preceding, KOH −; frequent sub-secund (on one side) branches between the whorls of branches on the main axes; outer branches often curving in one direction, apices nodding, tips 3–8 pointed; gonidia grayish, greenish or brownish, interspaces tomentose. (Pl. 1, f. 2.)
2. *C. sylvatica*

Podetia sometimes whorled throughout along the main axes, or with occasional single branches between whorls; peripheral branches upright, or in older plants curving or nodding, with ultimate branches in clusters of three or more, sometimes distinctly parallel, podetial surface smooth, or in older plants verruculose (with minute warts).

3. *C. mitis*

Podetia rarely polytomous, and usually dichotomous, (two-forked), straw colored, greenish or brownish.
KOH + pale yellow; outer podetial layers persistent, monopodial (single-stemmed) appearance clear in large axes; podetial surface smooth, or rough in older plants.

4. *C. tenuis*

KOH − monopodial appearance not so definite, podetia irregularly branched or subdichotomously divided, podetial surface rough with disintegrating gonidia as plant matures, gonidia greenish, yellowish or whitish, darkening.

5. *C. impexa*

Podetia in regular, smooth, compact colonies, plant masses often with an even, curving top, the podetia being all of nearly equal length; polytomous (many-branched), with whorls of branches around gaping axils, whitish or pale gray; KOH −, outer podetial layers often disintegrating, surfaces arachnoid. Distinctive because of the smoothly rounded masses. (Pl. 1, f. 1.)

6. *C. alpestris*

Subgenus 2. **Pycnothelia.** Ach. Primary thallus granular-crustaceous, persistent. Podetia short, ⅛ inch to one inch tall, stout, simple or short-branched, terminating in blunt tips. Apothecia small, brownish-red. "Resembling minute cacti."

7. *C. papillaria*

Subgenus 3. **Cenomyce** (Ach.) Th. Fr. Primary thallus foliaceous (with leaf-like squamules), persistent, or sometimes disappearing.
Series A. Cocciferae Del. Apothecia scarlet or rarely flesh-colored or whitish in some color forms.

a. Subglaucescentes Vainio. Primary squamules grayish green above, white beneath, podetia whitish to grayish-green, sometimes fertile with rather small scarlet apothecia, or sterile with blunt or pointed apices, mostly decorticate (without a definite outer cortex), decorticate areas farinose-sorediate or granulose.

Podetia usually basally corticate, but with the cortex usually discontinuous above, below apices, KOH −.

8. *C. Floerkeana*

Podetia sometimes basally corticate, but above wholly decorticate, and farinose-sorediate, KOH −.

9. *C. bacillaris*

KOH + yellow.

10. *C. macilenta*

These three species, together with *C. didyma* (listed in the earlier paper, but not here, although it may extend into northern New England), look much alike on casual observation, and often grow together, in the club range. *C. macilenta* is definitely distinguishable, even if the other characters are doubtful, by the instant yellow reaction with KOH. *C. didyma* has a less brilliant yellow reaction, but is distinguishable from *C. macilenta* by its usually lower and stouter form. *C. bacillaris* and *C. Floerkeana* are distinguishable by their taller, slenderer form, and absence of KOH reaction, as between each other they are sometimes doubtfully separable, and some lichenists question if they are separate species.

b. Stramineo-Flavidae Vainio. Primary squamules yellowish-green above, white or yellowish beneath, podetia yellowish-green.

Podetia cup-forming, sterile or fertile, (CaCl) KOH + pale yellow. Cortex persistent, not sorediate.

11. *C. coccifera*

Cortex distintegrating, usually sorediate, KOH −. Apothecia often rather large and conspicuous.

12. *C. pleurota*

Cortex persistent below, disintegrating above, cups with many sharp-pointed marginal divisions, usually incurved, with small apothecia on tips KOH + yellow. (Pl. 1, f. 3.)

13. *C. digitata*

Cortex continuous or rimose (chinky), lower part sometimes squamulose, cortex often yellow-sorediate, margins of cups often irregularly dentate or proliferate, podetia tallest of our red fruited Cladoniae, sometimes over three inches under favorable conditions in the north. KOH −. (Pl. 1, f. 5.)

14. *C. deformis*

Podetia not cup-forming, always terminated by apothecia; cortex continuous or areolately dispersed, or absent, KOH −. Plants not sorediate; podetia variously branched in several different forms, decorticate areas whitish, arachnoid. (Pl. 1, f. 4.)

15. *C. cristatella*

Plants more or less sorediate, podetia simple, club-shaped, decorticate areas naked; in one form the podetia are densely squamulose and sorediate and apothecia degenerate in size or wanting. KOH −.

16. *C. incrassata*

Series B. Ochrophaeae. Vainio. Apothecia brown to flesh color.

a. Unciales. (Del) Vainio. Primary thallus foliose, disappearing, seen only in young plants. Podetia not persistent at base, cylindrical to irregularly swollen, usually corticate, never squamulose, becoming much branched

and intertangled, *apices spinose*, which distinguishes this group from the Cladinae, which they resemble in massed habit and with which they often occur. The smooth cortex of the Unciales (except in C. Boryi), also distinguish them from the usually rough surfaced Cladinae. One to four inches high, dwarfed in alpine or exposed situations.

Podetia smooth and firm on surface, yellowish-gray to brownish-green, with axillary or internodal perforations in older plants, both sterile and fertile, with small brown apothecia, constructed at base, cupless.

17. *C. uncialis*

Podetia smooth, yellowish gray to pale yellowish green, in some forms bearing shallow cups, axillary perforations on fertile plants but rare on sterile.

18. *C. caroliniana*

Podetia delicate in surface, tending to be decorticate, dull ashy gray, often quite stout, up to 8 millimetres in diameter, older plants with reticulate or perforated surfaces and bearing conspicuous cups with perforated membranes, axillary perforations numerous.

19. *C. Boryi*

Podetia much branched, arising from branches or free fragments of dying podetia, or rarely from primary squamules, sub-cylindrical, cupless or sometimes cup-bearing, forming large or small clusters, cortex continuous or areolate, rarely squamulose at base, straw-colored or greenish, basal dead portions scarlet, apices brownish, subulate and sterile, or rarely terminated by small, abruptly dilated perforate cups, margins frequently spinulose or radiately lacerate or proliferous, apothecia solitary or clustered, sometimes perforate or lobate, brick red or brownish.

20. *C. amaurocraea*

b. Chasmariae (Ach.) Floerke. Primary squamules persistent or disappearing, white beneath. Podetia usually persistent basally, cupless or with *open cups*, not closed by a diaphragm, axils usually open.

Primary squamules largest of North American Cladoniae, with broad, rounded lobes, stout, branching podetia, with sterile subulate tips, or bearing small cups, simple or proliferous, rarely fruiting; faint yellow reaction with KOH. (Pl. 3, f. 8.)

29. *C. turgida*

Primary squamules small to medium, with finely incised to crenate marginal divisions.

Podetia reduced to short stalks bearing apothecia, or the apothecia sessile on the primary squamules. KOH —.

28. *C. caespiticia*

Podetia well developed.

Podeita cup-forming, cups from small and simple to large and densely proliferate, cortex disintegrating. KOH —.

25. *C. squamosa*

Cups with punctured or lacerate membranes and proliferations much branched, sometimes bearing second or third ranks of cups, each still further proliferate; or with cups largely abortive or absent, but podetia widely branching. KOH —. (Pl. 3, f. 2.)

23. *C. multiformis*

Primary squamules smaller than in the last three species, podetia bearing cups with no or very slight closing membranes, or cupless, KOH —. (Pl. 2, f. 2.)

24. *C. crispata*

Primary squamules small, lobate or laciniate, podetia cylindrical and erect, with narrow, perforate cups, with incurved margins, often with several erect or suberect proliferations, which are pointed or tipped with small, narrow cups; or with larger proliferations bearing relatively large cups, sometimes again proliferate, giving a two or three ranked effect, and a total height of two or three inches. Podetia sorediate from apex downward, base usually corticate and sometimes squamulose. KOH —. (Pl. 2, f. 4,6,7.)

26. *C. cenotea*

Podetia not cup-forming.

Plants very small and delicate, on decaying wood, sorediate-granulose, cortex dispersed or wanting, podetia short, simple or branched. KOH + yellow.

27. *C. delicata*

Podetia much-branched, branches often dichotomous, slender and elongated, cortex continuous or areolate, apices often subulate, axis irregularly gaping, KOH —. Pinnately branching forms of this species may be mistaken for some of the Cladinae, since the Cladinae, the Unciales and forms of C. furcata may be found together. But the Cladinae have blunt tips, the Unciales sharp tips, and while some forms of C. furcata have subulate tips they are not as sharp as those of C. uncialis, and their branching is more loose and sprawling than that of the others, and they more often have an olive hue which distinguishes them in mixed colonies, from the gray or green tints of the others. Densely branching forms were described and pictured in the earlier paper; the northern form here illustrated, var. racemosa, f. furcatosubulata, is simpler. (Pl. 3, f. 6.)

21. *C. furcata*

Like C. furcata, but sorediose. (Pl. 3, f. 3.)

22. *C. scabriuscula*

c. Clausae. Vainio. Primary thallus persistent or disappearing, squamules white or creamy beneath. Podetia usually basally persistent, cupless, *or with closed cups*, axils closed. Podetia not intertangled, but growing separately by themselves, except where crowded, when they may be attached by intergrowths on the podetia or cups. This series includes the common

cupped forms, familiar to the most casual observer of lichens, known to children as "Fairy Cups."

Podetia cup-forming.
Plants neither sorediate nor granulose.
Cups regular.
Cups deep, usually with short marginal proliferations, cortex warty-areolate, with flat raised plates, or smooth.

36. *C. pyxidata*

Cups shallow, 2 to 5 ranked, centrally proliferate, diminishing in size above, surfaces smooth, with marginal proliferations into small cups, or bearing apothecia, or with smaller cups scattered over surfaces and marginal apothecia. Cortex smooth, squamulose near base in one form.

33. *C. verticillata*

Cups shallow, 1 to 5 ranked, dentate or proliferate, proliferations arising from the margin or center of the cup and either solitary or radiately arranged, podetia sometimes densely squamulose, apothecia regular or finally lobate and perforate, solitary or clustered at the apices of podetia or proliferations. (Pl. 1, f. 6.)

34. *C. degenerans*

Cups shallow, broad or narrow, regular or irregular, in 1 to 4 ranks, proliferate from the margins, cortex smooth, greenish, or brownish in older plants, apothecia marginal, sessile or on stipes. Some forms relatively low, 1 to 2 inches high; others, as in var. *elongata*, among the tallest of Cladoniae, up to five inches in height, with small narrow cups when young, enlarging and becoming irregular as the podetia elongate. KOH — except var. *elongata*, + yellow. (Pl. 2, f. 1.)

35. *C. gracilis*

Cupless, podetia slender, cylindrical, terminating in long, sharp-pointed, olive-tinted tips, sterile. Cortex smooth or slightly areolate.

42. *C. cornuta*

Plants sorediose, or granulose.
Cupless.
Podetia slender, simple or slightly branched, scatteringly sorediate, usually sterile.

41. *C. cornutoradiata*

Bearing cups, large or small.
Cups irregular, shallow, often one-sided, with only one rank of proliferations, usually fertile.

40. *C. nemoxyna*

Poedtia subulate or truncate with small, narrow cups, rarely fruiting, soredia farinaceous, squamules large and with lobate margins, cups sorediate inside. KOH +, brownish.

43. *C. coniocraea*

Same as above, but with subulate podetia more frequently bearing apothecia, cups when present as above, but smooth inside.

47. *C. ochrochlora*

Podetia cupless, or cup-forming, in material seen scarcely cup-forming, but with a slight dent at top of cylindrical podetia; resembling *C. coniocraea*, but distinguished by the presence of the bases of the podetia of outgrowths of an isidioid character, in the form of coarse granules or minute squamules, simple or sparingly lobed. KOH + pale yellow, which also distinguishes the species from *C. coniocraea*, in which the reaction is brown.

44. *C. borbonica*

Cups deep and often large, simple, dentate or much varied by extensive and amply fruiting proliferations, either on stipes or smaller cups; granulate or more or less squamulose, in some forms densely so. KOH —.

37. *C. chlorophaea*

Like the above, but with farinose, rather than granular soredia; podetial cortex not verruculose as in *C. chlorophaea*, but with smooth, flat areoles.

38. *C. conista*

Like preceding, but with taller cups, sometimes covered with soredia, on inner and outer surfaces, KOH + brownish. (Pl. 3, f. 7.)

39. *C. fimbriata*

Cups shallow and small, irregular, or usually lacking and replaced by subulate apices which are often fertile. KOH —.

45. *C. pityrea*

Podetia slender, cylindrical or sub-cylindrical, rarely abortively cup-bearing, simple or branched, solitary or in groups, erect or flexuous, cortex warty or with small areoles, sometimes squamulose toward base; cups when present in axils of branches, apothecia terminating all podetia, pale brown or flesh-colored. (Pl. 2, f. 3.)

48. *C. botrytes*

Primary squamules small, medium to large; podetia simple and club shaped, or with short branches.

Podetia grayish-green to olivaceous, cortex continuous to areolate, surface sometimes flattened or depressed.

Primary squamules somewhat erect and densely crowded, podetia naked or squamulose, CaCl (KOH) bluish green.

46. *C. strepsilis*

Podetia short and slender, or stout, obconic, usually somewhat branched, smooth or squamulose. KOH, + yellow, followed by brick red, the only Cladonia with this color reaction, positvely identifiable when it appears.

31. *C. subcariosa*

Podetia subcylindrical or thickened toward the top, always fertile, branching, sometimes even from the base, branches suberect or spreading, sides fissured or grooved, cortex subcontinuous or areolate, decorticate portions between the areoles white, apothecia clustered at tips of branches, frequently perforate, light, dark or reddish brown. KOH + yellow. (Pl. 3, f. 5.)

30. *C. cariosa*

Podetia slender, cylindrical, "at length elongated, the fertile ones mostly simple but the sterile at length fastigiately branched," largely decorticate. KOH–. (Pl. 2, f. 5.)

32. *C. decorticata*

Forms of Species and Habitat Notes

1. *C. rangiferina* (L.) Web. In moss or thin soil over ledges, widely scattered and in dense colonies in favorable locations, found by writer along north shore of Gaspé; reported by A. F. Allen (Rhodora, Vol. 32, No. 377, page 91) in valley of Cap Chat River and on Mount Logan, 4,000 feet, Gaspé; found by writer near Federal Lead and Zinc Mines, Matane Township, Gaspé, at 2,000 feet; reported by C. W. Dodge, (Rhodora Vol. 28, p. 205) on Tabletop, 4500 feet, and Mt. Albert, 3700 feet, on Shickshock Mountains, Gaspé; received from G. F. Dillman, from western Maine, Grafton township; from Vincent J. Schaefer, from Mount Marcy in the Adirondacks; from F. K. Vreeland, on Blue Mountain, 3500 feet, Adirondacks. More common northward than in the club range: *f. crispata*, a low, dense form, may be looked for with the species.
2. *C. sylvatica* (L.) Hoffman, In openings in spruce woods, in Gaspé National Forest; reported by C. W. Dodge, from the Tabletop Range, and Mount Albert, 3800–4500 feet, in the Shickshocks, Gaspé; from Vreeland, South Pond, Adirondacks; probably widely scattered, and sometimes mixed with *C. rangiferina*, in shade.
3. *C. mitis* Sandst. Not as common northward as in the sandy areas of the coast strip in club range, but probably to be looked for in sandy soil in southern and central Maine; reported by Allen on Cap Chat River, Gaspé.
4. *C. tenuis* (Floerke) Harm. Found by writer in Matane Township, Gaspé County, Quebec, at 1500 feet; received from Avery, Chairback Mountain, Maine; and Vreeland, South Pond, Adirondacks. Probably occasional in north.
5. *C. impexa* Harm. Var. *laxiuscula* Del. reported by C. W. Dodge, on the Tabletop Range, in Gaspé. To be looked for with other Cladinae in the north, not seen by nor received by writer.
6. *C. alpestris* (L.) Rabenh. Received from Avery, Mount Katahdin and Chairback Mountain, northern Maine; Schaefer, Mt. Marcy, Adirondacks; A. T. Shorey, Basin Mountain, Adirondacks; M. L. Joslin, Lincoln Mountain and Couching Lion, Vermont; Mrs. Laura Woodward Abbott, Jay Peak, Vermont; Blue Mountain, Adirondacks, Vreeland; E. H. Walker, Mount Washington. Common on open mountaintops in

the north and in exposed places at lower levels. Reported by C. W. Dodge on high summits in Gaspé. (Pl. 1, f. 1.)

7. *C. papillaria* (Ehrh.) Hoffm. Small form, *f. papillosa*, with small papilliform podetia, found by writer on Mount Monadnock, N. H., 3,000 feet; not seen in Gaspé, not listed by Allen or Dodge, probably to be looked for in thin soil over ledges or sandy places not far from the coast in Maine, or possibly inland, apt to be overlooked by amateur collectors because so inconspicuous. Dr. Evans has specimens collected by J. C. Parlin in Hartford, Me. Tuckerman reported the species in the White Mountains.

8. *C. Floerkeana* (Fr.) Floerke. Not seen by writer, nor received from north woods, but may be looked for, with *C. bacillaris* and *macilenta*. C. W. Dodge reports it in Matane township, Gaspé. Dr. Evans has it from J. C. Parlin from Hartford, in central Maine.

9. *C. bacillaris* (Ach.) Nyl. Found by writer in Gaspé National Forest, at 1500 feet, on road from New Richmond to Federal Mine; reported by Dr. C. W. Dodge on Logan Range and by Allen on Cap Chat River; received from Vreeland, South Pond, Adirondacks; Dillman, Santanoni Mountain, Adirondacks, and western Maine; Shorey, Cranberry Lake, Adirondacks; Dr. Evans has specimens from Maine, New Hampshire and Vermont; probably fairly common in north.

10. *C. macilenta* Hoffm. Var. *styracella*, the common form, found by writer in Gaspé National Forest, near Federal Mine, Matane Township, and reported from same township by Dodge. Dr. Evans has it from J. C. Parlin, Hartford, Maine. Probably not rare, to be sought with *C. bacillaris.*

11. *C. coccifera* (L.) Willd. A few podetia received from M. L. Joslin, from Lincoln Mountain, Vermont, at 4100 feet, were identified by Dr. Evans as the coarsely granulate *f. Stemmatina* Ach. which is reported by Dodge from three stations in the Shickshocks, Gaspé; Dodge also found *var. coronata* in the gorge of the River Sainte Anne des Months, in the Tabletop Range, Gaspé.

12. *C. pleurota* (Floerke) Schaer. Received from E. H. Walker, from Mount Washington, N. H. Dr. Evans has specimens from Nova Scotia, New Hampshire, Vermont and Maine. Probably occasional in north. Allen found on Mt. Logan, Gaspé, a single podetium which he describes in his paper in Rhodora, May, 1930, as very stout in appearance owing to dense, large squamules, with cup 1.5 cm. in diameter; Robbins regarded it as a foliose, aberrant form.

13. *C. digitata* Hoffm. Apparently widely scattered in the north woods. Received from Vreeland, South Pond, and Schaefer, Mount Marcy, Adirondacks; Avery, Chairback Mountain, Maine; found by writer in Matane Township, Gaspé National Forest; reported by Allen on Cap Chat River and by Dodge on the Logan Range: Dr. Evans has it from New Hampshire and Vermont. Tuckerman reported it from Greenland. We have lately received it from Dillman, from Wittenberg Mt., in the Catskills. If in doubt as between it and the next species, the intense yellow re-

action with KOH identifies *C. digitata;* the following has no reaction. (Pl. 1, f. 3.)

14. *C. deformis* (L.) Hoffm. Common, and sometimes in large, robust and conspicuous colonies, throughout the north woods, received from all of the collectors named, and reported by Allen and Dodge at several places in the mountains of Gaspé, where this writer found it frequent, especially along tote roads in Matane township.
15. *C. cristatella* Tuck. This common scarlet fruited Cladonia, endemic to North America, extends into the north woods and climbs to 4,000 feet or more. It was included, from stations 1500 to 4000 feet, in the collections of all of the contributors named, and is reported by Allen and Dodge at high altitudes in the mountains of Gaspé. The writer found the smooth form, *f. Beauvoisii,* in larger size than any seen in the club range, making a strikingly handsome plant, along old tote roads near the Federal Mine and Lake Ste. Anne, in the Gaspé National Forest. Allen and Dodge report *f. vestita* in Gaspé, and it occurred in most of the specimens received from the writer's friends from northern stations. Allen reported the brown fruited *f. ochrocarpa* on the Cap Chat River, and Dodge found the densely branching *f. ramosa* on the Logan Range.
16. *C. incrassata* Floerke. Received from Vreeland, South Pond, Adirondacks, about 1800 feet, but not from other collectors, nor found by writer northward. Dr. Evans has no specimens from north of Massachusetts. Fink reported it near Mankato, southern Minnesota (as *C. cristatella paludicola,* an older name). In the club range it is most plentiful in the New Jersey Pine Barren swamps and on Long Island, with one station on Wawayanda Mountain, 50 miles inland. Search should be made for it in usual stations on rotten wood in swampy forests, northward, perhaps not far from coast, to endeavor to extend its range.
17. *C. uncialis* Floerke. Received from Vreeland, Blue Mountain, Adirondacks; Avery, Chairback Mountain, Maine; found by writer on Mount Monadnock, N. H.; mostly near *f. dicraea,* the form of exposed places in the club range; this form reported by Dodge on the Logan Range in Gaspé. Probably not rare in north.
18. *C. caroliniana* (Schwein) Tuck. Received from Joslin, Vermont; found by Merrill, near Rockland, Me.; not reported by Allen or Dodge, nor seen by writer, in Gaspé; Tuckerman reports it "throughout North America," including Newfoundland and the Arctic regions, as well as far south. Its prevalence in the club range in the sandy regions on Long Island and in the Pine Barrens of New Jersey suggests it might be looked for in similar regions in southern or central Maine, or Nova Scotia.
19. *C. Boryi* Tuck. Merrill found this at Rockport, Maine; and Dr. Evans has received it from Parlin, Hartford, Maine. Tuckerman reported it from the White Mountains, Newfoundland and Labrador. Its ample and robust occurrences on Montauk Point, Long Island, in our club range, suggest it may be looked for in similar places northward along or not far from the coast.
20. *C. amaurocraea* (Floerke) Schaer. This arctic-alpine species ranges from

the higher White Mountains and the northern shore of Lake Superior to Arctic America, being one of the most northern ranging Cladoniae. Allen reported it from the summit of Mount Logan, about 3700 feet. Dodge does not report in Gaspé. Dr. Evans calls attention to the fact that, according to Merrill, it was found by Miss Cummings on Mt. Moosilauke, N. H. It has lately been received from J. L. Lowe, who found it on Mt. Marcy in the Adirondacks.

21. *C. furcata* (Huds.) Schrad. Commoner forms, *var. racemosa, f. corymbosa* (Ach.) Vainio; var. *pinnata, f. foliolosa* (Del.) Vainio, were in collections received by the writer and made by himself, in the north woods; also, *var. racemosa, f. fissa*, with extremely fissured podetia, from Dillman, Schroon Lake region, and Santanoni Mountain, Adirondacks; *var. racemosa, f. furcatosubulata*, from Schaefer, Mount Marcy, which are distinctly more northern, although Dr. Evans found them in northwestern Connecticut. *Var. racemosa* reported by Allen on Mount Logan, Gaspé. The species, in several forms, is common northward.

22. *C. scabriuscula* (Del.) Leight. *F. farinacea*, found by writer in Gaspé; reported (?) as *C. furcata, f. scabriuscula* (Del.) Coem, by Dodge, on Mount Logan, Gaspé. Dr. Evans has it from Grand Manan Island, collected by Weatherby, and from various localities in Maine and New Hampshire. Specimens of *ff. surrecta* and *elegans* Robbins were collected by Robbins at Jackson, N. H. Probably occasional in high forests in north.

23. *C. multiformis* Merrill. *F. Finkii* (Vainio) Evans, with cups, found by writer near Tupper Lake, Adirondacks; received from Dillman, Santanoni Mountain, Adirondacks. Species reported on Mt. Logan, Gaspé, by Allen. Dr. Evans has it from Maine, New Hampshire and Vermont. Merrill lists numerous Maine stations in the Bryologist, January, 1909. *F. subascypha* (Vainio) Evans, with cups abortive or lacking, received from Thomson, from Harrison, Me. Probably not rare in north. (Pl. 3, f. 2.)

24. *C. crispata* (Ach.) Flot. *Forma infundibulifera*, with extensively proliferate podetia, seems to be the common form of this species in the north woods; found by writer in Matane Gaspé; received from Dillman, Santanoni and McIntyre Mountains, Adirondacks; and Old Speck Mountain, western Maine; and from Joslin, Lincoln Mountain, Vermont. (Pl. 2, f. 2.)

25. *C. squamosa* (Scop.) Hoffm. Common northward, in several forms, and usually more robust than in club range, including *ff. denticollis, phyllocoma, levicorticata, m. rigida;* probably others; *f. murina* from Vreeland, South Pond, Adirondacks; one or more forms included in collections from contributors named, and seen by writer in Adirondacks, Maine and Gaspé. Reported by Allen and Dodge on Mount Logan, Gaspé (above 3,000 feet); from Mount Marcy, Adirondacks, by Schaefer, at nearly 5,000 feet.

26. *C. cenotea* (Ach.) Schaer. *Forma crossota*, short and cylindrical, found by writer in Gaspé, near Federal Mine; reported by Dodge on Logan

Range, Gaspé; *f. prolifera*, with taller cups, with rather long proliferations found by writer in Gaspé; *f. exaltata*, longer, with two or three ranks of cups, received from Dillman, Old Speck Mountain, western Maine. (Pl. 2, f. 4, 6, 7.)

27. *C. delicata* (Ehrh) Floerke. *F. quercina* received from Vreeland, South Pond, Adirondacks; received from Parlin, Canton, Me., by Dr. Evans. Northern records are scarce and this species should be sought for by students with opportunities to do so, to locate possible northward extensions.
28. *C. caespiticia* (Pers.) Floerke, received from Thomson, Harrison, Me., Vreeland, South Pond, Adirondacks; found by writer in Matane, Gaspé; reported at South Thomaston, Me., by Merrill and received by Dr. Evans, from Parlin, Hartford, Me. Probably not rare in north but overlooked because of inconspicuous subsessile apothecia.
29. *C. turgida* (Ehrh.) Hoffm. *F. corniculata* (Pl. 3, f. 8) with large primary squamules and robust podetia, with cupped or subulate branches, common in Adirondacks from frequency in collections received from Vreeland, Dillman, Schaefer and Shorey. *F. scyphifera* reported by Dodge in Gaspé.
30. *C. cariosa* (Ach.) Spreng. *F. cribrosa* found by writer along tote road, near Federal Mine, Matane Township, Gaspé. *F. cribrosa* and *f. corticata* found by Allen on Cap Chat River, Gaspé; Species reported by Dodge at Cap Rosier, Fox River, at eastern tip of Gaspé peninsula. (Pl. 3, f. 5.)
31. *C. sub cariosa* Nyl. Received from Vreeland, open fields around South Pond, Adirondacks; not from collections of higher forests or mountaintops; not in Dodge's or Allen's Gaspe lists; found by Merrill at Thomaston, Me., on coast; may extend in lower elevations into northern New England.
32. *C. decorticata* Floerke. (Pl. 2, f. 5), found by the writer near Federal Mine, Matane, Gaspé.
33. *C. verticillata* (Hoffm.) Schaer. *F. evoluta* (Th. Fr.) Stein., found by writer near Jackman, Me., and in Matane, Gaspe; received from Vreeland, South Pond, Adirondacks; probably scattered in relatively lower elevations northward.
34. *C. degenerans* Floerke. (Pl. 1, f. 6). Received from Dillman, McIntyre Mountain, Adirondacks; Dr. Evans has specimens from Maine, New Hampshire and Vermont.
35. *C. gracilis* (L.) Willd. Common northward, various forms received from all the collectors named. Found by writer near Tupper Lake, Long Lake and Speculator, in Adirondacks; near Jackman, Me., and in Matane, Gaspé; reported by Allen and Dodge in valleys in Gaspé; common variety *dilatata* (Hoffm.) Vainio, with stout, smooth podetia, and its forms *anthocephela* (Floerke) Vainio, with squamulose podetia, and *dilacerata*, (Floerke) Vainio, with irregular squamulose cups may be looked for in colonies of the species. *F. chordalis*, with slender erect cylindrical podetia terminating in long points, or with small cups bearing acuminate pro-

liferations also occurs. From Avery, from Chairback Mountain was received *var. elongata* (Jacq.) Hoffm. tallest and most robust form of the species, some podetia five inches tall, with irregular cups and large apothecia, or with acuminate tips. This is reported by Allen and Dodge in the mountains of Gaspé. (Pl. 2, f 1.)

36. *C. pyxidata* (L.) Hoffm. Reported by Fink in Minnesota; Dodge seems to include *C. pyxidata* and *C. chlorophaea* under the former, listing several occurrences in Gaspè.

37. *C. chlorophaea* (Floerke) Spreng. As used by Dr. Evans (see earlier paper by this writer) this species and its several forms, is very common in the north and was frequently sent by all the collectors named. Allen reported it, without giving form, in the Cap Chat River Valley, and on Mount Logan; Dodge, as forms of *C. pyxidata*, in several places in the interior of Gaspé. Most of the forms listed by Dr. Evans, in the Cladoniae of Connecticut, and in the writer's earlier paper, occur in material seen or received from northern regions.

38. *C. conista* (Ach.) Robbins. A few podetia found by writer near Federal Mine, Gaspé; reported by Allen on the Cap Chat River; probably occasional in north; to be looked for with *C. chlorophaea*.

39. *C. fimbriata* (L.) Fr. F. major, (Hagen) Vainio, a few podetia found by writer near Tupper Lake, Adirondacks; presumably same form, with large cups, reported by Dodge, as *var. simplex, f. major*, in Gaspé. Dr. Evans has "the true fimbriata" from Maine (Parlin) and also from New Hampshire and Vermont. He writes that he will have a note on *C. major*, "which Sandstede keeps distinct," in a paper he is preparing, on additions to the Cladoniae of Connecticut, for Rhodora. This is scarce and material would be welcomed by Dr. Evans and this writer. As understood by the writer, it is like *C. chlorophaea*, but with larger and more flaring cups. (Pl. 3, f. 7.)

40. *C. nemoxyna* (Ach.) Nyl. Much more common northward than in club range; *f. fibula* found by writer in Matane, Gaspé; reported by Allen on Cap Chat River and Mount Logan; received from Dillman, Santanoni and McIntyre Mountains, Adirondacks.

41. *C. cornutoradiata* (Coem.) Vainio. Reported by Allen, also *f. subulata*, in the valley of Cap Chat River, Gaspé.

42. *C. cornuta* (L.) Schaer. Received from Avery, Chairback Mountain, Maine; reported by Dodge, Baker's Woods, Gaspé.

43. *C. coniocraea* (Floerke) Sandst. Common everywhere in favorable conditions in the north; *f. ceratodes*, with subulate tips, most frequent; *f. truncata*, with small narrow cups occasional.

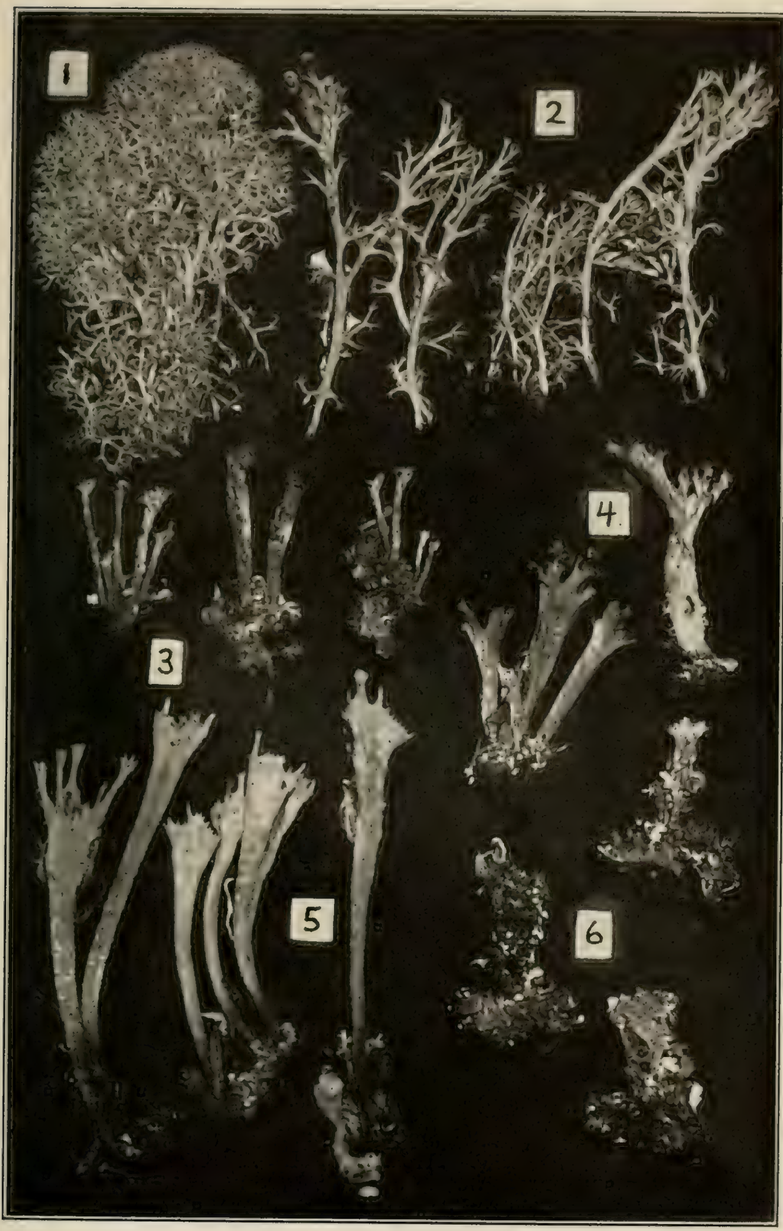
44. *C. borbonica* (Del.) Nyl. *F. cylindrica*, received by Dr. Evans from four localities in Maine, from Parlin. May be looked for northward. Reported by Allen in valley of Cap Chat River. Found by writer in club range since publication of earlier paper.

45. *C. pityrea* (Floerke) Fr. Dr. Evans has specimens from Maine and Vermont and it may be looked for northward.

46. *C. strepsilis* (Ach.) Vainio. Received by Dr. Evans, from Buckfield, Me., from Parlin; not listed in other papers cited; may be looked for northward not far from coast, perhaps.
47. *C. ochrochlora* Vainio. Received from Vreeland, South Pond, Adirondacks, and Thomson, Harrison, Me.; received from Dr. Evans from Maine, also from New Hampshire.
48. *C. botrytes* (Hag.) Hoffm. Found by writer on bark of dead spruce, beside road to Federal Mine, Matane Township, Gaspé National Forest, 48 miles north of New Richmond on the Bay of Chaleur. Listed by Fink in Minnesota and by Tuckerman from British Columbia; not in Allen's or Dodge's Gaspé lists; probably to be looked for northward on bark of dead conifers. Found by J. L. Lowe on Mt. Marcy in the Adirondacks. (Pl. 2, f. 3.)

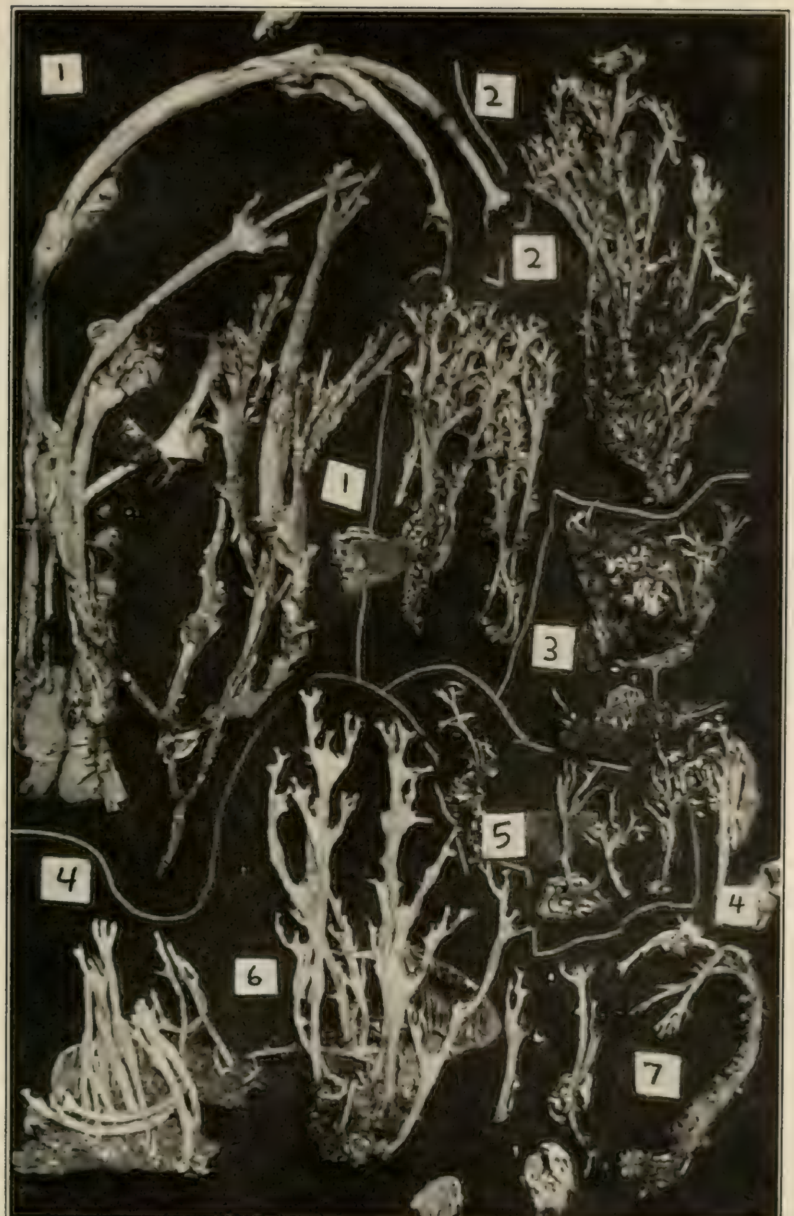
Since making up the above lists, the writer has received a very interesting collection of lichens, collected from above timber line on Mount Marcy, in the Adirondacks, from Mr. J. L. Lowe, of the State College of Forestry, Syracuse University, who is revising the Cladoniae for Prof. Fink's posthumous Manual of North American Lichens. Among them are two Cladoniae of note. One is *C. amaurocrea*, No. 20 in the above lists; the other *C. cyanipes*, which is described by Tuckerman, as *C. carneola, b. cyanipes*, with podetia "membranaceous-corticate soon becoming powdery, slender, fragile, from simple soon sparingly and irregularly short-branched; the cups disappearing in subulate branchlets."

Note: There is some question as to the exact identity of Fig. 4 and Fig. 7, on Plate 3. Dr. Evans first thought Fig. 4, *C. cornuta*, but it lacked soredia. Dr. Sandstede named it *C. gracilis, var. elongata*, but Dr. Evans now thinks it more like *C. gracilis. var. chordalis*. On his advice we follow Sandstede for the present. It may be an immature specimen, with character indeterminate. Fig. 7 is called *C. fimbriata, f. major* here, although Dr. Evans is calling a like plant *C. major*, in a second series of Notes on the Cladoniae of Connecticut, to appear in Rhodora, but admits difficulty in distinguishing *C. major* from *C. fimbriata*, "the only morphological difference being in size."



CLADONIAE OF THE NORTH WOODS

PLATE 1. Fig. 1, *C. alpestris;* Fig. 2, *C. sylvatica;* Fig. 3, *C. digitata;* Fig. 4, *C. cristatella, f. Beauvoisii*, a robust form from the Shickshock Mountains, Gaspé; Fig. 5, *C. deformis*, typical well developed form from Gaspé; Fig. 6, *C. degenerans.*



CLADONIAE OF THE NORTH WOODS

PLATE 2. Fig. 1, *C. gracilis, f. elongata;* Fig. 2, *C. crispata, f. infundibulifera;* Fig. 3, *C. botrytes;* Fig. 4, *C. cenotea, f. crossota;* Fig. 5, *C. decorticata;* Fig. 6, *C. cenotea, f. crossota*, a well developed phase; Fig. 7, *C. cenotea, f. prolifera.*

Cladoniae of the North Woods

PLATE 3. Fig. 1, *C. furcata, var. racemosa, f. fissa;* Fig. 2, *C. multiformis, f. Finkii;* Fig. 3, *C. scabriuscula, f. farinacea;* Fig. 4, *C. gracilis, var. elongata**; Fig. 5, *C. cariosa, f. cribrosa;* Fig. 6, *C. furcata, var, racemosa, f. furcatosubulata;* Fig. 7, *C. fimbriata, f. major***; Fig. 8, *C. turgida, f. corniculata.*

* See note page 74.

FIELD TRIPS OF THE CLUB

March 18 in Kissena Park

Eighteen members and guests joined the leader in a search for signs of spring along the line of the old railroad running through the swamp southeast of Kissena Park. This is the road said to have been built by A. T. Stewart, the famous New York merchant, in 1871, and ran from Flushing to Garden City, with an extension to Bethpage. At the beginning, near the Jamaica-Flushing trolley tracks, the Hazelnut, *Corylus americana*, was found, with the crimson stigmas just peeping forth from the winter buds, but the staminate catkins were apparently still in their winter condition. This clump of hazel has the largest and tallest shoots of any specimens known to the writer in Greater New York. Measurements showed the tallest shoots to be about twelve feet high and about 1½ inches in diameter at base. Reports of larger individuals would be welcomed. For this date the other evidences of approaching spring were very few. Of course colonies of skunk cabbage in flower were seen in the swamp: and, incidentally, the poison sumach was observed to be plentiful throughout the swamp. The red maple had opened its flower buds by only a small crevice, but the silver maple found planted along the streets of Flushing was pushing out its stigmas. Returning past the Park Lake, the party inspected the interesting rare trees in the upper Park on the hill—*Parrotia persica* not yet in flower, *Cornus Kousa*, *Cercidiphyllum*, *Acanthopanax ricinifolius*, etc. *Ilex crenata* was found to have suffered considerably, probably from the extreme cold of the winter.

Arthur Harmount Graves

March 18 to Hogencamp Mountain

The principal object of the field meeting was a large colony of the "Iceland Moss" lichen, *Cetraria islandica*, on the ledges southwest of Island Pond, in the western part of the Harriman Section of the Palisades Interstate Park. This colony, the largest in our range, except occurrences on Napeague Beach, Montauk Point, L. I., was brought to light, as many other interest-

ing botanical and geological features have been in the Park, by the marking of a new trail.

Up to the discovery of this colony, in September 1933, by the writer, the only known occurrence of *Cetraria islandica* in the Harriman Park was a stand of not more than twenty small plants on the Appalachian Trail on Fingerboard Mountain, west of Lake Tiorati found by Mrs. G. P. Anderson a few years ago. The lichen occurs in large olive brown clumps, along the edges of the broad, ice-smoothed ledges of the ridge, which, structurally is an extension of Surebridge Mountain, but is topographically a part of the Hogencamp Mountain—Ship Rocks—Black Rocks mass, so that it may be identified as on Hogencamp Mountain.

The region is interesting botanically and preserves in a large degree the original plant associations: it was part of the estate assembled by the late Edward H. Harriman, before he died, after which his widow gave the area to the Interstate Park. Mr. Harriman cared for it and protected it from fire during his life and the Park has done the same since.

Old and extensive colonies of earth and rock lichens are usually evidence of long freedom from ground fires, and such is the case on this new trail and on the Ramapo-Dunderberg Trail. The wide granite ledges are bordered by dense mats of *Cladonia rangiferina*, *C. uncialis*, *C. chorophaea*, *ff. simplex* and *carpophora*, and standing out sharply among these gray-green lichens are the brown clumps of *Cetraria islandica*. There is plenty of it on the trail and more probably on other ledges seen in the woods to the southeast.

Other lichens on this trail are *Stereocaulon paschale*, on ledges and boulders, some of the latter covered with it; *Cladonia cristatella*, *ff. vestita* and *Beuvoisii; Lecanora tartarea* and *cinerea; Lecidea russelli*, on limestone glacial boulders brought from the north; *Gyrophora Dillenii* and *Umbilicaria pustulata* (one small thallus found on living wood of an oak tree, unusual for this rock-loving lichen); on trees: *Cetraria atlantica*, and *Oakesiana; Evernia furfuracea*, var. *olivetorina*, on pitch pine, the first I have seen in the Harriman Park, although it occurs on Schunemunk, Kittatinny and Shawangunk Mountains.

Several large and well fruited colonies of *Baeomyces roseus*, evidently just starting to raise and expand their pretty pink-

topped podetia after the melting of the heavy snows of February and early March, were seen on the old Harriman Road south and west of Island Pond.

This region is one of the richest and most accessible for a variety of lichens. The numerous boulders carried by the ice from the Wallkill Valley, the Shawangunks and Catskills, lying on the granite, support unusual species, not found on the country rock.

RAYMOND N. TORREY

PROCEEDINGS OF THE CLUB

Meeting of January 17, 1934

The meeting was called to order at 3:30 P.M. at The New York Botanical Garden by President Hazen. There were 30 members present. The minutes of the meetings of December 20th and January 2nd were read and approved.

The following were unanimously elected to membership in the club: Dr. P. R. Berkholder, Schermerhorn Hall, Columbia University, New York; James W. Marvin, Schermerhorn Hall, Columbia University, New York; and Homer M. Northrup, 210 East Union Avenue, Bound Brook, N. J.

The resignations of Katie C. Kirkpatrick and Lorenz F. Logan were accepted with regret.

Professor M. A. Chrysler was elected Editor of the Club.

Dr. Edmund W. Sinnott of Columbia University gave an interesting talk on "Nuclear Size and Cell Size in the Polyploid Series of Datura Stramonium." This was illustrated by lantern slides.

Forman T. McLean
Secretary

Meeting of February 6, 1934

The meeting was called to order at the American Museum of Natural History at 8:15 P.M. by President Hazen. There were 60 members present.

The following were unanimously elected to membership in the club: Alma L. Ericson, 2181 Ryer Avenue, New York; Mr. Joseph Ewan, 3000 Life Science Building, University of California, Berkeley, Cal., Alan L. Martin, 434 West 120th Street, New York; Walter E. Rogers, Lawrence College, Appleton, Wis., Dr. John W. Shive, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

The resignations of Mrs. Gladys Gordon Fry, Mrs. Kenneth Goode and Mrs. Walter Rautenstrauch were accepted with regret.

Dr. Elmer D. Merrill, Director of The New York Botanical

Garden gave an interesting talk on the "Botanical Pioneers of the Orient." This talk was illustrated by lantern slides.

FORMAN T. MCLEAN
Secretary

MEETING OF FEBRUARY 21, 1934

Meeting was called to order at 3:30 P.M. at The New York Botanical Garden by President Hazen. There were 31 members present. Minutes of meetings of January 17th and February 6th and Council meeting of January 17th were read and approved.

The following were unanimously elected to membership in the club: Miss Jean Berger, 102 Manor Road, Staten Island, N.Y.; W. G. Camp, Columbia University, New York; Miss Natalie Hettger, 214 Division Avenue, Hasbrouck Heights, N.J.; Mr. Henry Jacoby, 3400 Wayne Avenue, New York; Miss Mabel E. Newman, 3016 Bronx Park East, New York.

The resignations of Miss Anna Hecht, Mr. L. H. Laphorn, Mrs. C. G. Stehle and Mr. Norwood C. Thornton were accepted with regret.

Realizing that the present world-wide financial depression has in certain instances caused such distress that some of the staunch supporters of the Torrey Botanical Club now feel temporarily unable to meet their club dues, and believing that the acceptance of resignations from such members under these circumstances would be very regrettable, be it therefore resolved:

That members of the Torrey Botanical Club who have been in good standing for a period of fifteen years or longer up to 1932 may be continued on our rolls as lapsed members, to receive the weekly Bulletins of the New York Academy of Science, but not the other publications of the club, for such period in the future as circumstances may warrant. The Treasurer shall notify each such member of this action by the club when the matter of standing in the club comes into question, and ask such members if they wish to be retained on the rolls as lapsed members for the duration of the present period of stress.

Dr. P. W. Zimmerman of the Boyce Thompson Institute gave an interesting illustrated talk on "How Mercury Com-

pounds Applied to Soil Contaminate the Air and Injure Plants" and "Effect of Chlorinated Water on Land Plants, Aquatic Plants and Gold Fish."

FORMAN T. MCLEAN
Secretary

MEETING OF MARCH 6, 1934

Meeting was called to order at 8:15 P.M. by President Hazen. Seventy-one people were present.

Announcement was made of the death of Mrs. Elizabeth G. Britton who joined the Torrey Botanical Club in 1879 and was the first to become a life member of the club.

Dr. Howe moved that a committee be appointed by the President to prepare suitable resolution by the Club and Dr. Howe and Dr. Harper were appointed as such a committee with authority to select a third member if they see fit.

Dr. Chester W. Emmons of the College of Physicians and Surgeons gave an instructive illustrated talk on "Plants that Cause Human Diseases" which proved to be of particular interest to a large number of medical people attending. Dr. Emmons stated that many of these fungus diseases attacking humans can subsist on dead organic matter outside of a body also and probably most of them are only incidentally parasitic on man.

FORMAN T. MCLEAN
Secretary

MEETING OF MARCH 21, 1934

The meeting was called to order by President Hazen at 3:30 P.M. at The New York Botanical Garden with 24 members present. The minutes of the meetings of February 21st and of March 6th were read and approved.

Dr. H. J. Lam, Director of Rijks Herbarium, Nanensteg, Leiden, Holland was unanimously elected to membership in the club.

The resignations of J. W. C. Goethart and Mr. Morton E. Peck were accepted with regret.

The following resolution was read by Dr. M. A. Howe and was accepted by a unanimous vote.

Elizabeth Gertrude Britton

The Torrey Botanical Club notes, with great regret, the passing of Elizabeth Gertrude Britton (Mrs. Nathaniel Lord Britton) on February 25, 1934. Mrs. Britton, then Elizabeth Gertrude Knight, was elected to membership in the Club on December 9, 1879, and was thus a member for more than fifty-four years—a longer term of continuous active membership than was ever enjoyed by any other person with the exception of her distinguished husband. She became a life member in 1930. For ten years after her graduation from the Normal College of New York (later Hunter College) she was a teacher in that institution. For three years, 1886–1888, she was the editor of the Bulletin of the Torrey Botanical Club.

Mrs. Britton was one of the group of members of the Torrey Botanical Club who were most active in promoting the idea of establishing a botanical garden in the City of New York. In fact, the first suggestion of such a garden has been traced to a remark that she made to Professor Britton during a visit to the Royal Botanic Gardens at Kew in the summer of 1888.

Mrs. Britton was for many years the leading authority on the mosses of North America and did much in popularizing their study and in developing and inspiring specialists in the taxonomy of this group of plants. She was the first and only woman elected to membership in the original Botanical Society of America, at a time when membership was limited to those who had distinguished themselves in research. In 1902, she was a prime-mover in organizing The Wild Flower Preservation Society of America and was for many years its executive secretary and treasurer. By her writings and lectures and by extensive correspondence, she aroused and developed sentiment in favor of protecting attractive plants that were in danger of extermination, especially in the vicinity of the larger cities. Her efforts resulted directly or indirectly in the passing of laws for the protection of our native flora in various states, in the establishment of branch societies for wild-flower preservation, and in the development of conservation activities in thousands of schools and garden clubs.

Resolved, That the members of the Torrey Botanical Club hereby record their profound sorrow over the loss of their long-time associate, Elizabeth Gertrude Britton, and hereby express their admiration of the very unusual intellectual endowments that enabled her to make such important contributions to American bryology and to play such an influential part in developing sentiment favorable to the conservation of our native flora.

Resolved, That the foregoing preamble and resolution be entered upon the minutes of the Club and that copies thereof be transmitted to Doctor Britton and to other members of her family, with warmest sympathy.

Marshall A. Howe
Robert A. Harper
Margaret A. Graham
Committee

Dr. Howe as Chairman of the Committee on Amendments to the Constitution read the report of the Committee on the recommended changes:

Proposed Amendments to the Constitution and By-laws of the Torrey Botanical Club as Published in Torreya for March–April, 1933 (33: 42–46):

It is moved to amend Article X—Council

(a) By changing, in paragraph 1, line 1, *sixteen* to *nineteen;*

(b) By adding, in line 2, after *President* the words *the retiring President, the two Vice-Presidents;*

(c) By changing, in line 7, *Five* to *Seven;*

and (d) By adding, in paragraph 2, line 4, after meetings, the words *and it may appoint committees to facilitate the conduct of its business.*

It is moved to amend Article XI—Members

By adding, in line 1, after *sustaining,* the word *life.*

It is moved to amend Article XIII—Annual Dues

(a) By omitting the word *Annual* in its title;

(b) By adding a third paragraph to read as follows:

Payment of one hundred dollars at one time shall entitle one to become a life-member without further payment of dues. After payment of annual dues for forty years, a member shall be eligible to election to life-membership and, in special cases, members for shorter periods may likewise be elected to life-membership.

After considerable discussion the Secretary was instructed to send out a special notice according to Section 21 of the Constitution.

Dr. R. P. Wodehouse, Vice-President of the club, gave a very interesting illustrated talk on "Evolution of Pollen Grains".

The meeting was adjourned at 4:55 P.M.

S. M. Pady
Acting Secretary

Meeting of April 3, 1934

The meeting was called to order by Vice-President Karling at 8:15 P.M. at Columbia University with thirty-nine members present.

Mr. Jonathan Gordon, 377 Eastern Parkway, Brooklyn,

New York and Professor F. McAllister, Dept. of Botany, University of Texas, Austin, Texas were unanimously elected to membership in the Club.

Professor John S. Karling of Columbia University gave a very interesting talk on "Tapping *Achras zapota* for Chicle in Tropical America."

FORMAN T. MCLEAN
Secretary

NEWS NOTES

Special price on Torrey Club publications. The following volumes of the Memoirs of the Club will be sold at the prices given as long as the supply lasts:

Vol. 5. List of Pteridophyta and Spermatophyta growing without cultivation in Northeastern North America. Pages 1–377. 1893–1894. List price $3.00, reduced to 50 cents.

Vol. 10. Burgess, Edward Sanford. History of Pre-Clusian botany in its relation to Aster. Pages i–xii, 1–447. 1902. List price $3.00, reduced to 50 cents.

Vol. 13. Burgess, Edward Sanford. Species and varieties of Biotian Asters, with discussion of variability in Aster. Pages i–xv, 1–419, plates 1–13. 1906. List price $3.00, reduced to 50 cents.

Vol. 6. No. 3. Hazen, Tracy Elliot. The life history of Sphaerella lacustris (Haematococcus pluvialis). Pages 211–246, plates 86–87, colored. 1899. List price 50 cents, reduced to 25 cents.

Vol. 11. No. 2. Hazen, Tracy Elliot. The Ulothricaceae and Chaetophoraceae of the United States. Pages 135–250, plates 20–42. 1902. List price $1.75, reduced to 50 cents.

The Brooklyn Botanic Garden reports that a box of Iris flower stems with buds was given to a visitor on June 1 and carried to London where they were blooming freely ten days later.

The flowers were miscellaneous varieties of the Bearded Iris.

The Botanic Garden also reports the opening on May 9th of a Local Flora Section of about three acres. This area is planted on an ecological basis.

Nathaniel Lord Britton

Dr. Nathaniel Lord Britton, oldest member of the Torrey Botanical Club, died on June 25th at his home in New York City. Dr. Britton joined the Club in 1877 while a student at the Columbia School of Mines. From 1889 till 1898 he was Editor in Chief of the Club's publications. His active interest in the Club continued to the last, probably no one else doing so much to shape its policies and direct its activities.

Dr. Britton was born in New Dorp, Staten Island, on January 15, 1859. He graduated from the School of Mines in 1879, took his doctorate the same year and was at once appointed to the faculty as an assistant in geology. In 1886 he became instructor in geology and botany and in 1891 assistant professor. He was president of the Botanical Society of America in 1896, 1897 and 1921.

He was a leader in the group of scientists instrumental in organizing the New York Botanical Garden. He became director of the Garden in 1896 and directed the erection of the buildings and the laying out of grounds. In 1927 he resigned as director but continued his botanical research there till illness compelled him to relinquish it last December. Dr. Britton's aim as director of the garden was first to establish and collect the plants native to New York State and then to gather plants from other regions for the education of the public. The famous hemlock grove on the Bronx River, a growth never cut and the most southerly stand of the species near the coast, formed the nucleus for the first half of the work and specimens which Dr. Britton himself brought back from Cuba, Jamaica, Puerto Rico, the Bahamas and other West Indian Islands aided in the other part of the work.

Under Dr. Britton's guidance the Garden became outstanding among botanical institutions of the world for its herbarium of North American, and West Indian plants and for its living collections of palms and cacti.

His best known work is probably the "Illustrated Flora of the Northern United States and Canada." He also wrote a "Manual of the Flora of the Northern United States and Canada," "Flora of Bermuda," "The Bahama Flora," numerous botanical papers and, with J. N. Rose, a four volume monograph of the cacti which is the leading reference work on the subject.

THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of Torreya in which their paper appears, will kindly notify the editor, when returning proof.

Reprints should be ordered when galley proof is returned to the editor. George Banta Pub. Co., Menasha, Wisc. have furnished the following rates:

	4pp.	8pp.	12pp.	16pp.	20pp.	24pp.	28pp.	32pp.	48pp.	64pp.
25 copies	$1.54	$2.70	$4.01	$4.84	$6.21	$7.15	$8.90	$9.29	$13.80	$17.49
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150 "	2.97	5.06	7.15	8.36	11.22	13.31	15.62	16.72	23.48	29.48
200 "	3.85	5.55	7.86	9.18	12.44	14.85	17.38	18.53	25.90	32.56
300 "	4.23	6.82	10.12	11.77	16.33	19.30	22.55	23.15	33.22	41.14

Covers similar to that of Torreya. First 50 copies, $2.25. Additional covers, 1½ cents each. Plates: 100 for $1.00

OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 60, published in 1933, contained 682 pages of text and 32 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.

Vol. 34 July-August, 1934 No. 4

TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR
THE TORREY BOTANICAL CLUB
BY
GEORGE T. HASTINGS

John Torrey, 1796-1873

CONTENTS

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THE TORREY BOTANICAL CLUB

MEMBERSHIP

All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100.; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications.

Meetings of the Club are held on the first Tuesday of each month at the American Museum of Natural History, New York City, and on the third Wednesday at the New York Botanical Garden.

TORREYA is furnished to subscribers in the United States and Canada for one dollar per annum; single copies, thirty cents. To subscribers elsewhere, twenty-five cents extra, or the equivalent thereof. Postal or express money orders and drafts or personal checks on banks are accepted in payment. Subscriptions are received only for full volumes, beginning with the January issue. Reprints will be furnished at cost prices. All subscriptions and other communications relating to the business of the club should be addressed to 450 Ahnaip Street, Menasha, Wisconsin, or to the Treasurer, Mrs. R. A. Harper (Mail address—Schermerhorn Hall, Columbia University, New York City).

Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

Vol. 34 July-August, 1934 No. 4

A Talbot cypress swamp at Greenbury Point, Maryland

Charles T. Berry

Greenbury Point is situated easterly across the Severn River from Annapolis in Anne Arundel County, Maryland and is mapped by the Maryland Geological Survey as Talbot formation. As a matter of fact although most of the Point was bevelled by the Talbot sea to form the Talbot terrace of late Pleistocene age much of the area is made up of sediments belonging to the Aquia formation (Eocene). In the summer of 1932 the writer discovered, as a result of wave cutting, another of those interesting buried bald cypress forests wlich are so frequently found in the Pleistocene of the Coastal Plain north of the present northern limits of the bald cypress.[1]

This buried cypress swamp was revisited on September 28, 1933 by Dr. R. E. L. Collins and the author at which time a great number of fossil seeds, which had weathered out of the dark carbonaceous mud, were collected. It is the description of these seeds and the remains of the Pleistocene cypress swamp which forms the basis of the present paper.

The hurricane—which did so much damage along the Atlantic Sea Coast during the month of September—washed away about seven feet of the end of the Point. This erosion did not expose any new cypress stumps. The Point at the time of our visit had a vertical face of approximately 15 feet with no slumping at its base—due to the recent storm. There are several contrasting lithologic beds in this 15 foot vertical range and most of these beds pinch out in an east and west direction. From all aspects this swamp occupied a deep valley cut in the Eocene sediments which was subsequently covered by reworked Eocene material.

[1] Similar deposits are also found at many localities within the modern range of the species.

At the base of the cliff there is a five foot bed of very black carbonaceous clay. It is in the lower portion of this bed just at tidal level that the cypress stumps are located. This part of the bed is tightly interwoven with the roots and knees of the cypress stumps, so much so that in places they form a solid wooden floor. This bed extends in an east-west direction for about a hundred feet and then disappears under the sand of the beach. The upper surface of the bed is very irregular for there are in two places evidence of old stream channels. These channels were cut from 1–3 feet deep below the surface and they have

Fig. 1 Showing section and cypress stumps at Greenbury Point, Maryland

a width of several feet. They are now filled with very coarse iron stained quartz sand. On the weathered surface of this bed and for a depth of about 2 inches below the surface one finds botryoidal aggregates—up to $\frac{3}{4}$ inches in diameter—of vivianite. Vivianite is a hydrous ferrous phosphate which is often found in cavities of fossil bones and in such swamp deposits as described herein. This mineral after it is partly oxidized is a very intense blue turning duller as oxidation progresses.

During my first visit to this locality I found in this lower bed three poorly preserved casts of Unios. These fossils are in

such a bad state of preservation that it is impossible to determine them beyond the fact that they are Unios. While visiting this locality in 1933 I found on the weathered surface of this carbonaceous bed, near its eastern end, a number of fossil seeds and fragments of plants.

Overlying the carbonaceous bed there is a three foot layer composed of clay and sand greatly iron stained. There are irregular layers of ironstone running unsymmetrically throughout the bed. The clay is grayish brown in color and contains a few grains of white quartz distributed throughout. This bed, which is barren of fossils, pinches out towards the east and west.

Between this bed and the next outstanding one is a thin layer of about 6 inches of white sand composed almost entirely of clear well rounded quartz grains associated with a few milky quartz pebbles of about ¼ inch in diameter. This layer of sand is continuous across the entire face of the Point, but fades out after a short distance.

The next bed is a very outstanding one. It is about 1½ feet thick and has a very green color. This color is due to the glauconite which makes up the greater part of the material of this zone. This zone maintains a uniform thickness throughout its length, but it can only be traced a short distance in an east-west direction for it intermingles and dies out into a bed of sandy clay. Just why is a bed composed of glauconite found covering a Pleistocene cypress swamp? That is the first question which presented itself to me, but after following the bed around the Point in both directions and finding that it died out I came to the conclusion that it must contain reworked glauconite from Aquia formation. Along with this glauconite I found fine flakes of white mica. This evidence is also substantiated, as I will show later, by the fact that the age of some of the fossils which I collected are much later than Eocene.

Overlying this glauconite bed there is a layer of 3½ feet of Pleistocene sand and gravel, the upper part of which is mostly top soil. This uppermost layer is continuous over the entire end of the Point.

Clustered around the extreme end of the Point and exposed —only at low tide—are about 25 cypress stumps. The size of these stumps range from 2 to 6 feet or more in diameter. In

several cases there are distinct traces of the "knees" clustered about the base of the stumps. It is a great wonder that the wood of these stumps is in as good condition as it is considering the ice and storms which they withstand during the winter months. Figure 1 shows the face of the Point and several of the cypress stumps partly submerged in the water.

At the time of my first visit to this locality I collected a large quantity of the black carbonaceous muck with the hope that I might be able to find some seeds in it. However, after spending considerable time working over this material while it was soaking in water, I was forced to conclude that seeds must be very rare in the deposit. It was therefore with great enthusiasm that I collected the following fossil material which had weathered out on the surface of the bed. These fossils are: —Rhizomes, *Vitis cordifolia*, leaves of *Taxodium* sp., acorns and cups of *Quercus* sp., and *Retinodiplosis taxodii*.

Rhizomes

Several rhizomes belonging to some species of monocotyledon, probably a marsh plant were found—one of which I have illustrated (Fig. 2, No. 4). This one is more or less spherical except for shriveling. At one end there is a circular depression while at the opposite end there is a bunch of stubby rootlets. Circumscribing this rhizome are several very thin ridges—two of which can be seen in the figure—which are about equally distant from each other. Upon these ridges there are tiny nodes unequally spaced which form the base of the short rootlets. Nearer one end these rootlets are more numerous and more closely spaced.

Very similar rhizomes are found on various kinds of swamp grasses today.

Vitis cordifolia Michaux

There was only one specimen of this grape seed collected, but it is in a very good state of preservation. This grape is commonly called chicken or frost grape among many other names and it inhabits low lying areas near streams and in swamp thickets. Britton and Brown gives the range as from New England westward to Nebraska and south to Florida and

Texas. I feel sure the fact that only one seed was found was due to our overlooking them because of their minuteness.

Grape seeds are very common in deposits of this character, often however, being too badly preserved to give them a specific name. This species of grape has been reported from the Wicomico and Pamlico—both Pleistocene—in Washington. The genus Vitis ranges from the upper Cretaceous to the present.

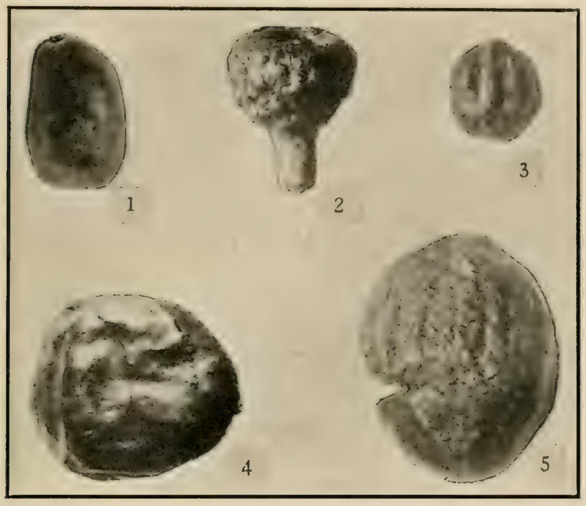

Fig. 2

1. Retinodiplosis taxodii Felt×2
2. Cup of Quercus sp.×2
3. Vitis cordifolia Michaux×2
4. Rhizome×2
5. Acorn of Quercus sp.×2

Taxodium sp.

The genus *Taxodium* is represented by several poorly preserved leaves. It is most likely that these leaves belong to *Taxodium distichum*, the common bald cypress, which is found today in the nearby regions farther south. These leaves were too poorly preserved to give a definite specific name to them. Even too poorly to be illustrated.

Along with these *Taxodium* leaves and the cypress stumps were found three galls belonging to the species *Retinodiplosis taxodii*.

The range of the bald cypress in the Coastal Plain region is from Southern Delaware and Maryland southward to Florida and westward along the Gulf Coastal Plain to Texas. Many Pleistocene cypress swamps have been discovered within the present range of this species while numerous finds have been reported beyond its range showing that the bald cypress is slowly retreating southward.

The geological range of this species is from Pliocene to recent.

Quercus sp.

Among all the seeds collected, acorns were the most numerous. A definite identification of this species was impossible due to the fact that many of the acorns were immature and the rest too poorly preserved for identification, however, if leaves had been present one might have been able to determine their species.

The mature acorn (No. 5) is oval in shape, somewhat pointed at apex, and the surface slightly striated. The character of the surface changes between the region marked off by a circular line around the fruit and the base of the acorn, where the crack is observed on the left side. This marks the extent to which the acorn was enclosed within the cup. This acorn is split—in the plain of the illustration—thus showing the badly preserved cotyledons.

In the immature specimen (No. 2) only the very tip, which is pointed, of the acorn can be observed. The stalk forms not quite half of the entire height of the cup. The scales on the cup are very thick and closely imbricated making a very stubbled surface. Many of the immature acorns were collected, but without their cups in most cases.

The common oak which is found in the vicinity of Greenbury Point is *Quercus ilicifolia* Wang which is found growing throughout the Coastal Plain region. This Pleistocene oak is probably not closely related to the present inhabitant. The geological range of the oak is from the Upper Cretaceous to recent.

Retinodiplosis taxodii Felt

Some of the most common objects to be found along with the bald cypress scales are numerous small galls (*Retinodiplosis*

taxodii). These galls are the result of some insect which has modified the young cypress seed so that in the mature state they bear no resemblance to naturally developed cypress seeds. These galls are very often found closely packed in the cypress cones.

Three of such galls were collected, two being globose while one was somewhat shriveled. In all three cases there is a minute oval opening at one end.

The fact that the glauconite bed is a reworked one excludes any idea that the cypress swamp might be of Eocene age. This is corroborated by the fact that *Taxodium distichum* has a geological range from the Pliocene to recent. Along with this bald cypress I found several insects galls, *Retinodiplosis taxodii;* a grape seed, *Vitis cordifolia;* and numerous acorns and cups of some undeterminable species of *Quercus;* and also several rhizomes of some unknown marsh plant.

There have been many other discoveries of buried cypress swamps very similar to this one, too many to list here, all of which have been proven to be of Pleistocene age. Therefore it is correct to assume that this deposit at Greenbury Point is of Pleistocene age.

Johns Hopkins University
Baltimore, Maryland

The Blister Pine in West Virginia

EARL L. CORE

The Blister Pine occurs at two localities, perhaps elsewhere, in mountain swamps of West Virginia: in Canaan Valley, Tucker county and at Cheatbridge, in Randolph county. Millspaugh[1] originally referred the West Viriginia plant to *Abies balsamea* Miller. However, its characters did not seem to match exactly those of that species and he later[2] decided that the West Virginia plants belonged rather to *A. Fraseri* (Pursh) Lindl. Recent studies made by the writer have emphasized the uncertainty of identification, and the geographical position, midway between the range of the northern species (*A. balsamea*) and that of the southern one (*A. Fraseri*), suggests that ours may represent a distinct species, possibly derived by hybridiza-

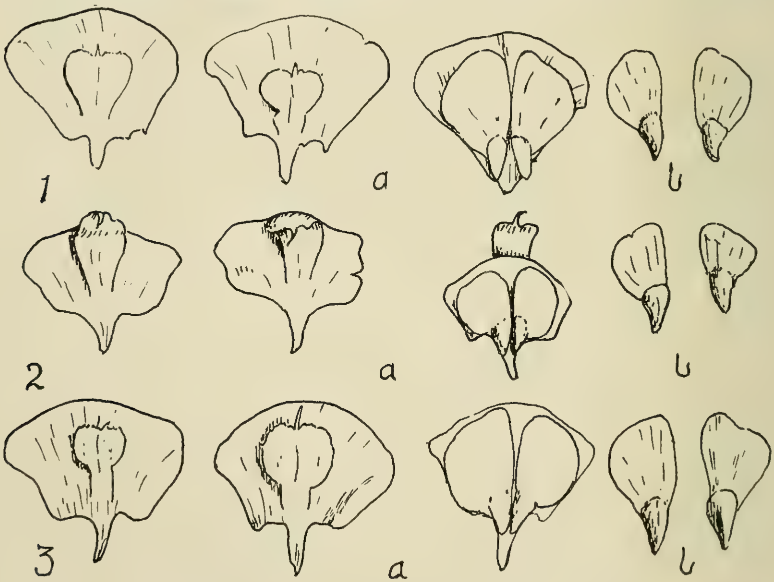

Fig. 1 Abies balsamea Miller, from Vermont a, scales and bracts; b, seeds
Fig. 2 A. Fraseri (Pursh) Lindl., from North Carolina a, scales and bracts; b, seeds
Fig. 3 A. ?, from West Virginia a, scales and bracts; b, seeds

[1] Millspaugh, C. F., Bull. W. Va. Agr. Exp. Sta. 2:477. 1892.
[2] Millspaugh, C. F., W. Va. Geol. Surv. V(A):201. 1913.

tion from the above mentioned species. Preliminary investigations have brought out some interesting features, which the author desires to study more critically before making a final decision. Since another season will be required for the completion of this study, a preliminary note was deemed advisable. It is quite possible, of course, that both *A. balsamea* and *A. Fraseri* may occur in the state, together with the new form.

The principal point of distinction between *A. Fraseri* and *balsamea* is a difference in the relative length of the scales and subtending bracts of the fruiting cone. In *A. Fraseri* the emarginate bracts are longer than the scales, with the upper part conspicuously projecting and reflexed, whereas in *A. balsamea* they are shorter and not projecting. The West Virginia plant has the bracts shorter than the scales and is clearly more closely related to the northern species. However, it appears to differ quite markedly from *A. balsamea* in its more acute leaves, larger seeds, and broader scales.

There is an added point of difficulty in the fact that the West Virginia material itself appears to represent two races, as there are a number of striking differences between those collected at Cheatbridge, and those collected in Canaan Valley.

It is hoped that comparative studies continued during the 1934 season will serve to clear up the confusion that has existed in regard to these West Virginia plants.

DEPARTMENT OF BIOLOGY, WEST VIRGINIA UNIVERSITY

A few unusual plants noted in Western New York

IRVING WILLIAM KNOBLOCH

In an area as large as western New York, comprising as it does, some seven counties, it is not unusual to find plants which, although native to the region, occur in such small numbers and in such out-of-the-way places that they have been overlooked by botanists. Another factor which makes field botany an inexhaustible occupation and a very delightful one, is the slow but constant influx of adventives from all portions of this and foreign countries.

One of the plants, which, judging by all the published records, has been overlooked is *Agrimonia parviflora* Ait., the small-flowered Agrimony. This plant, located at Protection, N. Y., is rare also in the Cayuga Lake Basin area, according to Wiegand and Eames.

Lamium purpureum, the Red Dead Nettle, is a plant which has become naturalized from Eurasia. It can be considered rare in this part and in the central part of New York State. A single plant was found at the City Hospital in Buffalo, N. Y.

Both David F. Day and Frank Johnson, former local botanists, located *Astragalus canadensis* L., a Milk Vetch more common farther west, on Squaw Island in the Niagara River. It may be of interest to note that it also occurs farther north in the river, on Cayuga Island.

Coronilla varia L., the Axwort, was collected in the summer of 1928 at Armour, N. Y. This is a native of Europe and has been previously reported from Windom, N. Y. by Frank Johnson.

Unpublished data indicates that *Galinsoga ciliata* (Raf.) Blake. is known to occur sparingly in this area. However, it may be recorded that the writer has found it rather abundant in one or two places particularly in Buffalo, N. Y.

Bromus commutatus Schrad., a native of Europe, is rapidly gaining a foothold in the Tonawanda section of the state, fairly close to Buffalo, N. Y.

Southern plants are less likely to occur here than European or western ones but *Bidens coronata* (L.) Fisch. has braved our climate and can be seen growing by the thousands at Lincoln Park near Tonawanda, N. Y. To the best of my knowledge, this plant has not been hitherto recorded for this area.

ALLEGANY STATE PARK
RED HOUSE, N. Y.

Botanical notes from Long Island

Roy Latham

While collecting at Promised Land, Napeague, Long Island, during May, 1929, I found *Rumex hastatulus* Muhl. fairly common in one spot in a sandy, brackish meadow, growing in pure beach sand. The species seems worthy of special note because of its rarity on Long Island. In my collecting on the eastern half of Long Island I have found it but once before, a small colony northwest of the village of Riverhead near the Sound shore, on sand dunes. The plants at Promised Land were large and showy, of a reddish-purple color.

A large colony of *Lythrum linear* L. was discovered near Flanders, Long Island, N. Y., on August 6, 1933. The habitat is the head or upper margin of an extensive salt meadow with a quaking, mucky soil and fresh-water springs, the soil very rich in decayed vegetable humus. The plants had an average height of over two feet and well branched. On this date the plants were about one-half in bloom. The color of flowers varied from nearly white to purplish-white. Associated with this species was found *Lilaeopsis lineata* (Michx.) Greene, which is one of the rarest species in the higher flora of Long Island, and *Fimbristylis castanea* (Michx.) Vahl, which is uncommon on the salt marshes of Long Island.

I can find no previous record for either Long Island or New York state of *Lythrum linear*. The Flanders colony is evidently a new species for the flora of the state, and a northward extension of the range of this species, its northern limit known heretofore in New Jersey.

Orient, Long Island, N. Y.

Lichens on old tombstones

Raymond H. Torrey

An inviting subject for botanical research was suggested by hasty observations of the lichens on tombstones in a ramble through central Putnam County recently. It seemed possible to approximate the age of lichen thalli by the dates on the stones. In the old cemetery at Gilead, where Enoch Crosby, (the American spy, "Harvey Birch" of Fenimore Cooper's novel) is buried, an old red sandstone headstone, placed in 1795, was so richly covered with crustose and foliose lichens as to obscure part of the inscription. Marble headstones of about 1840 to 1850 bore only crustose lichens.

Judging from the species of lichens and the age of the stones, crustose lichens establish themselves first, such as *Lecanora cinerea*, *Candelariella vitellina* and *concolor*, then *Lecanora tartarea*, and at length *Rinodina oreina*, which last was unexpected, as it is a species of high hilltops in this vicinity. Older stones bore all of the above, but in addition the foliose *Physcia obscura* and *Parmelia saxatilis*. The headstone of 1795 bore all of these.

In a newer cemetery, north of Carmel, on stones bearing dates of the eighties of the last century, colonies apparently twenty or thirty years old, of *Lecanora cinerea* and *Rinodina oreina* had established themselves on smoothly cut granite stones. Here is an unusual botanical objective which will be shared with anyone who has the inclination and opportunity to pursue it. City churchyards would yield no lichens, the city air is unfavorable to them, but old country cemeteries, in purer air, ought to be rewarding for lichenists, though collecting would be difficult—one couldn't carry home the headstones. Some of the colonies, with the golden *Candelariella* and gray-green *Lecanoras* and *Rinodina*, were very attractive. The question as to the conjunction of the symbiotically associated algal and lichen cells, on these stones, out in an open graveyard, away from sources of either, was stimulating to speculation.

A New Daylily Book[1]

Dr. A. B. Stout, Director of the Laboratories of The New York Botanical Garden, has devoted many years to the study and hybridization of the daylilies, meaning species and garden varieties of *Hemerocallis*, and his new book "Daylilies" brings together his main results. Although not so stated in the book, it is understood that he has actually grown nearly 20,000 seedlings of hybrid origin. The clones thus produced show great variation in height, time of flowering, and in form, size, and color of their flowers. A notable achievement, from the gardener's point of view, is the production of pink, red, and maroon shades, a definite break from the yellow, orange, or orange-red tones of the old-fashioned daylilies. The earlier chapters of the book discuss the botanical characteristics of the daylilies and the natural species and their distribution. The artificial key to the diagnostic characters of the thirteen recognized species will attract the attention of systematic botanists. It is of interest to note that two daylilies, presumably introduced from central or eastern Asia, had found their way to western Europe by the time the first herbals and gardening books were being printed. These were the fragrant, early-flowering, seed-producing Lemon Daylily, afterwards named *Hemerocallis flava* by Linnaeus, and the summer-flowering Fulvous or Tawny Daylily, *H. fulva* L., the historic botanical type of which appears to have been a self-unfruitful clone, propagated by vegetative division only. The latter was brought to America by the early settlers and has often persisted by old home-sites and along roadsides in the northeastern United States. Chapter VI on "The horticultural clones of daylilies," containing an alphabetical descriptive list of about 175 clonal varieties, is the longest chapter of the book. A discussion of the heights, colors, odor, freedom and time of flowering, and habits of opening, will prove of much practical value to any who are planning to make use of daylilies in their gardening operations. The author advises the selection of at

[1] Stout, A. B. Daylilies: The wild species and garden clones, both old and new, of the genus Hemerocallis. Pp. i–x+1–119. *pl. 1–36.* Mr 1934. The Macmillan Company, New York. Price $3.00.

least twenty-five varieties to show adequately what may be accomplished by the ornamental use of the genus *Hemerocallis*. Their almost complete freedom from disease and from troublesome insect pests is a strong recommendation of the daylilies in these days of continuous horticultural warfares. Chapters on culture, seed reproduction, and breeding, an appendix, with much interesting information as to books, persons, and places, and an index, complete the volume. Of the 36 illustrative plates, several are in colors.

MARSHALL A. HOWE

Trees of the Southeastern States[1]

Attractively bound in green cloth, this book should prove of real use to those desiring to know the trees of the states from Virginia to Florida. It is written for amateur botanists and nature lovers generally, but is detailed and accurate enough to be of value to the professional botanist. Two hundred and twenty-seven species of trees, native or naturalized, are described. Each species is illustrated with drawings of the leaves and fruit and often of the flowers as well. The key to genera at the beginning is based on both leaf and fruit characters which may at times make it difficult to use in the absence of fruit. Where separation in the key is based on leaf proportions—"blade less than twice as long as broad" or "leaves much longer than broad"—it may be only by the method of trial and error that the sassafras, elms and birches will be found in the latter group. Similarly in the keys to species, given in every case where two or more occur, the separation by leaf size or size of tree may sometimes cause trouble. But as descriptions are ample and the illustrations clear the trouble should not persist. Varieties are discussed under the species, but are not usually included in the keys. Species that seem doubtful are discussed under the forms they most closely resemble:—thus *Padus Cuthbertii*, *neomontana* and *alabamansis* are found under *P. serotina; Malus glaucescens*, *bracteata*, *redolens*, *platycarpa*, *elongata* and *cuneata* under *M. coronaria; Fraxinus Darlingtonii* under *F. pennsylvanica;* and

[1] Trees of the Southeastern States, William Chambers Coker and Henry Roland Totten. Pp. i–vi+1–400, pl. 1–3. 1934. The University of North Carolina Press, Chapel Hill. $2.00.

no less than twelve species of *Crataegus* under *C. meridiana*. Incidentally 18 species of *Crataegus* are described, though the authors state that "125 species (trees and shrubs) have been described in the area covered and Sargent includes 35 arborescent hawthorns in the same area." The student who is not a specialist in hawthorns should be grateful for their handling of the genus. For most species one common name and one scientific are given. For a few two or more common names are given and where there may be confusion because of changes in the use of scientific names, synonyms are given. We suspect that in a few cases the common names given are ones the authors think should be used, rather than ones that are in use. For example—Mountain Red Oak (*Quercus borealis*), Red Oak (*Q. Borealis* var. *maxima*), Swamp Red Oak (*Q. Shumardii*) and Southern Red Oak (*Q. rubra*). Though, of course, anyone who can distinguish these species will use the scientific names. Altogether the book is admirably adapted to its purposes,—it is attractive and it is easily used.

George T. Hastings

FIELD TRIPS OF THE CLUB

Trip of April 15 to Branchville, Conn.

A party of twenty-two visited the region which was new to most of them. Before taking the trail through the woods a short visit was made to the pegmatite quarry where many fine specimens are available. Due to the continued cool weather few plants were seen in bloom. Deep blue-purple hepatica blossoms were numerous, half hidden in the thick ground covering of dead leaves. Other plants seen were antennaria, rattlesnake plantain, spotted wintergreen, pyrola, hellebore, skunk cabbage, golden saxifrage, blue violet, partridge berry, dogtooth violet, pipsissewa and wintergreen. We were pleased to find a large stand of *Buxbaumia aphylla*, a small stand of *Bartramia pomiformis*, *Hedwigia albicans* and *Polytrichum piliferum*, the latter with its antheridial rosetts. Three lycopodiums were seem along the trail, *L. lucidulum*, *L. obscurum* and *L. complanatum*. We lunched near a swamp and those interested in herpetology did some investigating and found eggs of the wood frog and of the spotted salamander, water newts, spotted salamanders, spring peepers and a leopard frog.

Eleanor Friend

Trip of May, 20, 1934, to Bay Terrace, Staten Island

Eight members and guests of the club braved the heat and the mosquitoes and saw the usual run of spring flowers, including *Tussilago Farfara* still holding forth, and several species of violets: *Viola lanceolata primulifolia, papilionacea, fimibriatula*, and *pedata* var. *leneariloba*. Eight common ferns were found, as well as *Botrychium virginianum* and *Woodwardia areolata*, the latter showing last year's fertile fronds standing up among the new sterile ones. Two Aronias and several ericaceous shrubs were in bloom, and both staminate and pistillate forms of *Myrica carolinensis*. *Orobanche uniflora* was blooming in the grass along the street, and *Comandra umbellata* was plentiful in the woods. We dug up *Comandra* to see the parasitic attachments its roots had formed on those of other plants. *Cypripedium*

acaule was found in several places, in one place accompanied by *Pogonia verticillata*, the chief find of the day.

HESTER M. RUSK

TRIP OF MAY 20 TO THE FAHNSTOCK ESTATE, N. Y.

The party started from the Wodehouse cottage on Oscawana Lake, took the Cold Spring road north to Mud Lake. The road leads through a dense hardwood forest in which species of oak are dominant. Much of the land in this region had been cleared and farmed, but about forty years ago was abandoned and allowed to revert to forest. Occasionally, however, were seen some of the giants of the original forest, principally white and red oaks. Scattered throughout are a large number of sassafras trees, all of which had suffered more or less severe winter injury but apparently none of them quite killed. Mud Lake is small and shallow with reedy and marshy shores, and brownish water in which grow an abundance of white water lilies. The leaves of these had already appeared, and lay with their freshly expanded surfaces gleaming in the sunlight over the placid surface of nearly the whole lake.

From Mud Lake the party followed the Appalachian trail northward to Clear Lake. Though this little lake is less than a quarter of a mile away it is more than a hundred feet higher than Mud Lake, and is in an entirely different setting. The shores of Clear Lake are rocky and dry, and, where ever a foothold may be obtained, are occupied by small pitch pines (*P. rigida*), scrub oak (*Q. ilicifolia*), mountain laurel (*Kalmia latifolia*) and various species of *Vaccinium*. The water of the lake is clear and cold, and devoid of any conspicuous aquatic vegetation.

From Clear Lake the party continued northward through rather open forest of *Betula lutea*, *B. lenta* and *B. populifolia* in varying proportions, with an admixture of poplars, hemlock, beech, an occasional linden and numerous badly diseased young chestnuts. The many straight and slender boles of chestnut standing whitening in the sun or rotting on the ground showed that much of this region had been occupied by a dense and nearly pure stand of chestnut prior to the visit of *Endothia parasitica*. Over a large part of this region was a dense ground cover of *Lycopodium companatum*, with occasional plants of *L. obscurum*.

Many interesting plants were encountered on the trip besides those already mentioned. Of those that were in flower, the wild azalea (*A. nudiflora*) with its gorgeous pink flowers was a conspicuous and beautiful object almost throughout. The stemless slipper (*Cypripedium acaule*) was seen in considerable abundance, particularly in the vicinity of Clear Lake. Here were also found the dainty yellow flowers of the dwarf dandelion (*Krigia virginica*) growing in small soil pockets in the otherwise bare rock. Other plants seen in flower were the striped maple (*Acer pennsylvanicum*), bladdernut (*Staphylea trifolia*), white baneberry (*Actaea alba*), and dwarf ginseng (*Panax trifolium*). But none of these was seen more than once or twice on the trip, for they must be accounted as rather rare in the region.

R. P. Wodehouse

Trip of May 27, to Deep Brook Glen and Goffle Ridge, N. J.

The party passed through a small swamp on the way to the glen, then up to the ridge. The following plants were found in small groups or societies:—*Comandra umbellata* on gravel; *Podophyllum peltatum*, *Pentstemon hirsutus* and *Aquilegia canadensis* on top soil on the trap rock of the ridge; *Corydalis sempervirens* on the trap rock; *Viola hastata* in the shade on the ridge and *Nepeta hederacea* on wet sandstone. The following were found growing singly:—*Saxifraga pennsylvanica* in the swamp; *Trientalis americana*, *Cypripedium acaule*, *Maianthemum canadense*, and *Mitella diphylla* in wet woods or near a small stream; *Polygonatum biflorum* and *Pyrola americana* in dry woods; and *Actea alba* and *Smilacina racemosa* on wet sandstone. The swamp and wet banks were dominated by jewel weed, *Impatiens;* the ridge by grasses; and the woods by wild sarsaparilla, *Aralia nudicaulis*.

Mr. and Mrs. J. Van Saun

PROCEEDINGS OF THE CLUB

Meeting of May 1, 1934

The meeting was called to order at 8:25 P.M. at the American Museum of Natural History by President Hazen with twenty-three members present.

The following were unanimously elected to membership in the club: Mrs. Lucy B. Abbe, 435 West 119th Street, New York City; Mr. Thomas S. Constantine, 793 East 169th Street, New York City; Mr. Donald Eves, 514–17th Street, University, Virginia; Mr. Morton Goldstein, Brooklyn College, Brooklyn, New York.

The following members who have been in good standing in the Club for forty years or more were elected to life membership in accordance with the recommendation of the Council.

Prof. Henry H. Rusby, elected Jan. 11, 1887.

Dr. Smith Ely Jelliffe, elected Dec. 13, 1887.

Dr. John K. Small, elected Jan. 14, 1890.

Dr. John H. Barnhart, elected Oct. 28, 1891.

Miss Delia W. Marble, elected Dec. 30, 1891.

Dr. Carlton C. Curtis, elected Nov. 30, 1892.

Dr. Levine announced the policy of the Bulletin to carry more advertisement and urged the members to get in touch with firms of their acquaintance for which such advertising would be appropriate.

Dr. Hazen announced that the Council has reduced the price of certain Memoirs of the Torrey Club.

Dr. R. P. White of the New Jersey Agricultural Experiment Station then spoke on "Dutch Elm Disease and Other Disease of Shade Trees." He said that foliage diseases of trees were usually not critical even when the outbreaks are severe. One causing considerable disfigurement of the common horse chestnut is leaf blotch. Foliage and twig diseases such as anthracnoses, diebacks and cancers are also in general not critical. Diseases of the woody tissues usually have no ready means of control and make them dangerous. Imported diseases are in general the worst. The Dutch elm disease he characterized as probably less dangerous than recent newspaper reports have lead us to believe, as it will probably spread more slowly than

did the chestnut blight and it is quite possible that the present control measures undertaken may prove effective to check or even to entirely eradicate it. The disease is apparently carried by bark beetles of which the small European ones are the most frequent carriers in this country. The larger bark beetle, which has not yet been found in this country, has caused the comparatively rapid spread of the disease in Europe and even there the disease has done less damage than has been commonly reported. Dr. White's report was most encouraging in its tone and aroused considerable discussion. One feature he particularly emphazised, that no tree that has been attacked by the disease has ever recovered from it, so that the removal of diseased trees is inevitable. He also emphasized the importance of continuing the control measures now being undertaken.

Forman T. McLean
Secretary

Meeting of May 16, 1934

The meeting was called to order at the Brooklyn Botanic Garden at 3:30 p.m. with eight members present.

We have lost Miss Harriet E. Russell and Mr. William H. Smith by death.

Dr. Arthur H. Graves, Dr. Alfred Gundersen and Miss Hester M. Rusk lead the group on an "Inspection of the ecological areas in the new Local Flora Area in the Brooklyn Botanic Garden, such as the Long Island Pond, The Bog, and the Wooded Area."

Miss Hester M. Rusk read a paper on "The Local Flora Areas of the Brooklyn Botanic Garden" in the absence of Dr. Svensen who was ill.

Forman T. McLean
Secretary

THE TORREY BOTANICAL CLUB

Contributors of accepted articles and reviews who wish six gratuitous copies of the number of TORREYA in which their paper appears, will kindly notify the editor, when returning proof.

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Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

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The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
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EDITED FOR
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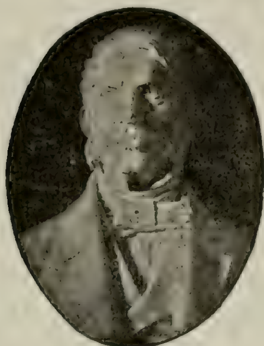
BY
GEORGE T. HASTINGS



John Torrey, 1796-1873

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THE TORREY BOTANICAL CLUB

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All persons interested in botany are invited to join the Club. There are three classes of membership: *Sustaining*, at $15.00 a year; *Life*, at $100.; and *Annual*, at $5.00 a year. The privileges of members are: (a) To attend all meetings of the Club and to take part in its business, and (b) to receive all its publications.

Meetings of the Club are held on the first Tuesday of each month at the American Museum of Natural History, New York City, and on the third Wednesday at the New York Botanical Garden.

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Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

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Taxodium distichum in the Paleozoic area of Alabama

Roland M. Harper

Of the two species of *Taxodium* in the eastern United States, the smaller one, *T. ascendens* (or *imbricarium*), the pond cypress, seems to be strictly confined to the coastal plain, from Dismal Swamp to eastern Louisiana. The other, *T. distichum*, which is better known, and sometimes distinguished as the river cypress, has a much wider range, and extends a little outside of the coastal plain in a few places, notably along the Tallapoosa, Coosa and Tennessee Rivers in Alabama and the Wabash in Indiana,[1] besides a few west of the Mississippi River which need not be specially considered here.[2]

Its inland or northern limit may be determined partly by some climatic factor, such as the average or minimum temperature or length of growing season; but one should be cautious in making such an assumption, for both species of *Taxodium*, as well as many other trees, are successfully cultivated considerably farther north than they grow naturally, apparently indicating that when a tree is protected from competition it can stand more extreme conditions of climate (and soil) than it does in its natural associations.

More likely the partiality of *Taxodium distichum* to the coastal plain is connected with the fact that alluvial swamps are much more common there, in comparatively level areas of unconsolidated strata, than in the hill country, with relatively hard rocks of Paleozoic age and older. It is an old species, geologically speaking, and its present colonies outside of the coastal plain may have had their start many thousand years

[1] See C. C. Deam, Trees of Indiana, ed. 2, p. 30. 1921.

[2] For notes on the distinguishing characteristics of these trees and their distribution see Bull. Torrey Club **29**: 383–399. 1902; **32**: 105–115. 1905; Pop. Sci. Monthly **85**: 351–352, 356–357. 1916; Geol. Surv. Ala., Monog. 9: 61–67. 1928.

ago, when the coastal plain deposits extended farther inland than they do now.

In Alabama the locality for *Taxodium distichum* farthest removed from the coastal plain, and the only one north of the Tennessee River, as far as known, is on Cypress Creek in Lauderdale County. There it is common for a few miles along the creek near its mouth, just west of Florence, about 400 feet above sea-level, but I have not observed it on the river near by. According to the geological maps the nearest coastal plain deposits are about 15 miles away (some west and some south), and all on uplands, at least 200 if not 300 feet higher. Presumably these deposits (of the Tuscaloosa formation, of Cretaceous age) once filled the Tennessee River lowlands too, but have been removed by erosion.

There is also a good deal of cypress along Bear Creek in Colbert County, nearly all the way down to its mouth, but little or none along the river adjacent, probably because the seasonal fluctuations of the river are too great.[3] This creek rises in the plateau region, and enters the Tennessee River from the south at the Alabama-Mississippi line, after crossing the state line a few times in its northward course. According to the 1926 geological map of Alabama its bed is all in Paleozoic rocks, mostly limestones, but the Tuscaloosa formation, consisting mostly of sand, gravel and clay, caps the hills on both sides of it close by. The accuracy of some of this mapping is open to question, however, as will be shown below.

The government soil map of Franklin County, Alabama (date of publication not indicated, but apparently 1932) shows a large "Cypress Slough" in the western part of the county, about three miles east of Red Bay and a mile northeast of Bear Creek; and as I had no previous record of *Taxodium* in that county, I visited the place on March 18, 1933. The geological map shows the creek at that point to be bordered by a strip of Paleozoic (Mississippian) limestone at least half a mile wide on either side; but I found a steep gravelly bluff on the south side and flat loamy bottoms about a mile wide and mostly culti-

[3] See Science II. **36**: 760–761. Nov. 29, 1912. Both the Cypress Creek and the Bear Creek localities, which I had known since 1906, were inadvertently omitted from the ditribution map of *Taxodium* on page 64 of my Alabama tree volume previously cited.

vated on the north side; typical coastal plain features, with no sign of any limestone. It is quite possible that there is limestone near enough to the surface there to influence the tree growth (for *T. distichum* seems to be rather fond of limestone, so to speak), but how the geologists could have detected it is a puzzle.

The particular cypress slough shown on the soil map was not identified, and may have been partly destroyed by drainage and cultivation since the field work was done, about 1927; but *Taxodium distichum* was scattered over the bottoms in suitable places, and usually associated (as it often is) with *Nyssa uniflora*, which I likewise had not seen in that county before, not having been far enough away from the railroads.[4]

The first Alabama locality mentioned is in the Tennessee Valley region, and the Franklin County one is on a stream draining into the Tennessee River, though it is on coastal plain deposits. A cypress swamp in the Appalachian Valley (which extends without interruption from New York to Alabama) now remains to be described.

The present paved highway from Birmingham to Tuscaloosa, about half way between those cities, at the boundary between Jefferson and Tuscaloosa Counties, crosses Cooley Creek, a small tributary of the Cahaba River. The locality is in that part of the Appalachian Valley known locally as Jones Valley, a few miles from the place where the Paleozoic rocks of the valley dip out of sight beneath the coastal plain deposits. The various formations crop out in narrow belts trending northeast-southwest, and the creek cuts across them approximately at right angles. The road at that point runs parallel to the geological belts, through a level calcareous valley, skirting the southeastern base of a chert ridge, with several springs issuing from it, especially about a quarter of a mile southwest of the creek in Tuscaloosa County. These springs give rise to small streams running southeast across the gently sloping valley floor, and soon joining the creek, in a swampy area probably inundated by the creek in rainy weather. It needs no chemical analysis to show that the spring water is calcareous, for that is sufficiently indicated by the presence of water-cress and periwinkle shells.

[4] See Geol. Surv. Ala., Monog. 9: 282–284. 1928.

At the point described, along these small streams, close to the road, a gently sloping area of three or four acres is occupied by a pretty dense cypress swamp, with perhaps 200 trees. Just here the modern highway follows the route of the old Huntsville road, which was in use 100 years ago, and must have been traveled at various times by several geologists, and others who should have known cypress when they saw it, but apparently no mention of this outlying colony ever got into print. (About a mile to the southeast there is a main line of railroad, built about 1870, but the cypress is not visible from that.) I had traveled the highway by automobile several times in the last few years, but somehow never noticed the *Taxodium* until I passed that way on a bus on my way back from New York on Oct. 26, 1932.

According to the geological map, it is only about three miles down the valley from this point to the nearest area of the Tuscaloosa formation, though some of the Paleozoic strata can be traced at least 15 miles southwestward before they finally disappear. The cypress swamp is not immediately adjacent to Cooley Creek, but separated from it by a belt of ordinary creek-bottom vegetation, and just what causes the difference is not clear. I went into the swamp on Jan. 29, March 12, April 18, and Oct. 19, 1933, and made the following notes on the composition of the vegetation.

Taxodium distichum outnumbers by far all other trees. Next in abundance is *Liquidambar Styraciflua*, and there are a few trees of *Salix nigra*, *Fraxinus americana*, *Ulmus alata*, and *Celtis* sp., the last near the outer edge. Small trees are represented by *Morus rubra* (near the edge) and *Carpinus caroliniana*. *Berchemia scandens* and *Rhus radicans* are common woody vines, and there are a few specimens of *Bignonia* and *Parthenocissus*. The only shrub observed was *Sambucus canadensis*, and that may not have been there always, as it is noted for its weedy tendencies.[5] The most abundant herb is *Senecio lobatus* (or *glabellus* as it is now called), and it is very conspicuous in April. About a dozen other herbs were noted once each, and there are also a few weeds and mosses.

There are some puzzling peculiarities about the growth of

[5] See discussion of this point by Asa Gray and others in American Naturalist **1**: 493–494; **2**: 38–39; **3**: 282. 1867–1869.

the cypress. Even from the highway one can see that none of the trees have the flat top that characterizes both species of *Taxodium* in old age,[6] and one might infer from that that the trees had been planted by some early settler, perhaps within 100 years. This neighborhood, known as Bucksville, has been settled something over 100 years, and in a cemetery close by there are several tombstones dated between 1830 and 1840. But just what motive the settlers could have had for planting a grove of cypress in a swampy place, about thirty miles from any other known locality for the species, is not clear.

Interior of the Bucksville cypress swamp, Tuscaloosa County, showing two of the larger trees, many smaller ones, and numerous knees a foot or less in height. Jan. 29, 1933.

On going into the swamp I found that about half a dozen of the trees were decidedly larger than the rest, about five feet in diameter at the ground and three feet above the enlarged butt, and those may be several hundred years old, though *Taxodium*, like many other trees, grows faster when it has plenty of room than when it has strong competition from other trees. Curiously enough, these larger trees all have many dead limbs down to within a few feet of the ground, which strongly suggests that they were once in a comparatively open place, and the lower limbs

[6] See Science II. **36**: 760–761. Nov. 29, 1912; Geol. Surv. Ala. Monog. 9: 61, 62, 1928.

died after younger trees grew up and shaded them. The trees from one to two feet in diameter all have smooth straight trunks (as shown in the illustration), as a result of crowding.

One possibility is that there was once a normal cypress swamp here, and the early settlers cut out all but a few of the trees, which then put out lateral branches which flourished until a new crop of younger trees made it too shady for them. But cypress is such a durable wood that if any trees had been cut within a century or two their stumps should still be in evidence; but I saw no stumps.

Another possibility is that this was once a spring-fed pond, or meadow, with a few scattered cypresses, and that sediment brought down by the creek since some of the surrounding country was cleared has raised the ground surface and made conditions more favorable for the germination of *Taxodium*, and allowed a crop of younger trees to spring up. And possibly this is all the human interference there has been, though it would be remarkable if there had not been more, with people living close to the swamp for more than a century.

As cypress is a rather valuable wood, it is a wonder that this swamp was not invaded by lumbermen long ago. And as it is now in plain sight from a much-traveled highway, some such fate may overtake it almost any day. But if it should escape exploitation for another generation or two, and be studied again at the end of that time, perhaps some interesting developments could be noted.

University, Ala.

Mycorrhizae of Wading River region, L. I.

L. K. Henry

In the summer of 1931 and 1932 the writer collected rootlets of thirty-six different trees and shrubs from Wading River region, Long Island. These collections were made in the vicinity of Deep Pond located in a pine-barren community whose predominant soil type is Sassafras loam with a narrow projecting arm of Sassafras sandy loam on the northwest side. The soil of the area immediately bordering the lake, however, where the rootlets were collected belongs to the Babylon sand which consists of a brownish-yellow sand to a depth of three feet. There is no differentiation into layers, other than a slightly darker colored surface due to incorporation of some organic matter.[1] The Babylon sand as well as most of the other soils of the area, showed a decided acid reaction according to a statement received from Loundsbury. Although this soil is unimportant agriculturally, one finds oaks, hickories, pitch pines, a few birch and ericaceous shrubs flourishing.

These rootlets were preserved in 5% formaldehyde until there was an opportunity to prepare microscopic slides from them. Mycorrhizae were found in all thirty-six collections with the ectotrophic type predominating.

Mycorrhizal Hosts and Types

The following list of trees and shrubs was investigated and found to be mycorrhizal hosts either for the ectotrophic or endotrophic type of infection. So far as the writer knows, the species indicated by an asterisk are new additions to the list of mycorrhizal hosts.

Ectotrophic: (Ectendotrophic type included)

Conifers

Juniperus virginiana L.
Pinus resinosa Ait.
Pinus rigida Mill.
Pinus Strobus L.
Pinus virginiana Mill.

[1] Loundsbury, Clarence, and others. Soil Survey of Suffolk and Nassau Counties, New York. Bureau of Chemistry and Soils, (U. S.) 1928, No. 28.

Deciduous Trees and Shrubs

Betula populifolia Marsh.
Carya laciniosa (Michx. f.) Loud.
Carya ovata (Mill.) K. Koch
Castanea dentata (Marsh.) Borkh.
Cephalanthus occidentalis L.
Platanus occidentalis L.
Populus grandidentata Michx.
Prunus serotina Ehrh.
Quercus alba L.
Quercus coccinea Muench.
Quercus ilicifolia Wang.
Quercus prinoides Willd.
Quercus stellata Wang.
Quercus velutina Lam.
Rhus copallina L.
Rhus glabra L.
Robinia Pseudo-acacia L.
Salix cordata Muhl.
Salix pentandra L.
Sassfras variifolium (Salisb.) Ktze.

Ericaceous Shrubs

Gaylussacia baccata (Wang.) C. Koch
Kalmia latifolia L.
Leucothoe racemosa (L.) Gray
Lyonia mariana (L.) D. Don

Endotrophic:

Deciduous Trees and Shrubs

Acer rubrum L.
Aronia arbutifolia (L.) L.f.
Amelanchier canadensis (L.) Medic.

Ericaceous Shrubs

Myrica carolinensis Mill.
Clethra alnifolia L.
Vaccinium stamineum L.
Vaccinium vacillans Kalm.

The endotrophic type of mycorrhizae was found upon the rootlets of seven species in the collection. Externally these showed bead-like swellings and swollen tips and internally intracellular granular masses, hyphae, fragments of hyphae and spore-like bodies.

The remaining twenty-nine species harbored the ectotrophic type. The conifers were characterized by the dichotomously branched short roots and coralloid clusters, and the deciduous trees and shrubs by coralloid clusters and unbranched short

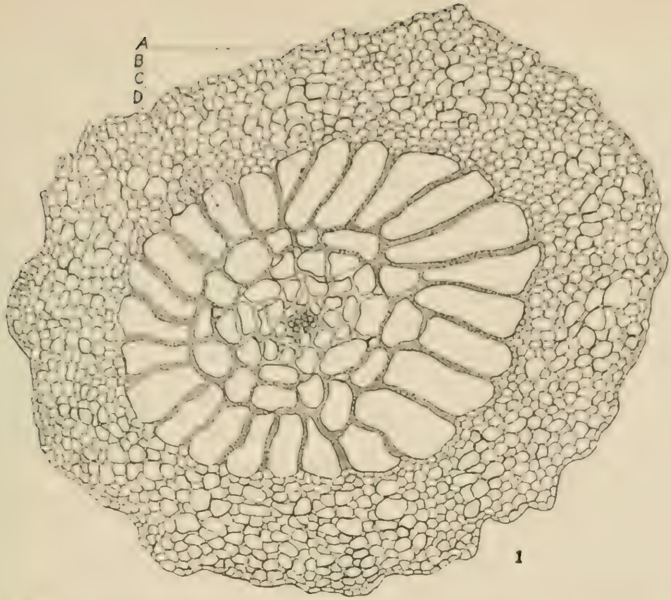

Fig. 1. Cross-section of ectotrophic mycorrhiza from *Quercus ilicifolia* showing fungal mantle of pseudoparenchyma tissue (A); intercellular net (B) producing radial elongation of cortical cells (C); hypertrophy of cortical cells (D); ×200.

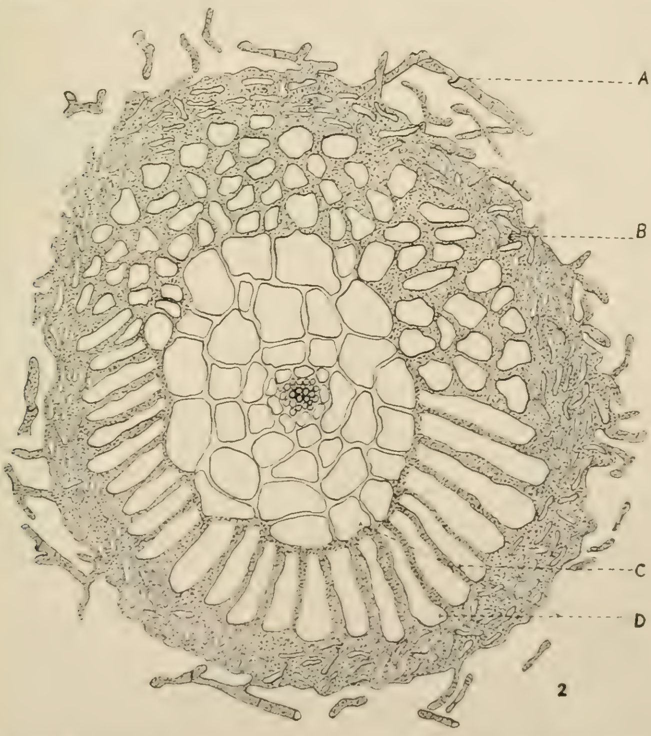

Fig. 2. Cross-section of ectotrophic mycorrhiza from *Lyonia mariana* showing clamp connections (A) on hyphae projecting from the prosenchymatous fungal mantle (B); intercellular net (C); hypertrophy of cortical cells (D); ×200.

Data for New Host Plants

New Host Plants	Date of Collection	External Form of Infected Rootlet	Internal Structure
Ectotrophic:			
Betula populifolia	Aug. 31	Coralloid	Prosenchyma fungal mantle, intercellular net, cortical cell hypertrophy.
Cephalanthus occidentalis	Aug. 32	Coralloid	Thin prosenchyma fungal mantle, intercellular net occupies two-thirds of cortex, cortical cell hypertrophy.
Quercus ilicifolia	Aug. 31	Coralloid	Pseudoparenchyma fungal mantle, intercellular net with radially elongate cells on one side only, hypertrophy.
Quercus prinoides	Aug. 31	Coralloid	Prosenchyma fungal mantle, intercellular net, hypertrophy.
Rhus copallina	Aug. 32	Swollen short-roots	Prosenchyma fungal mantle, intercellular net, one row of radially elongate cortical cells, hypertrophy.
Salix cordata	Aug. 32	Coralloid, short-roots	Prosenchyma fungal mantle, intercellular net, hypertrophy.
Salix pentandra	Aug. 32	Coralloid	Pseudoparenchyma and prosenchyma fungal mantle, intercellular net, hypertrophy.
Gaylussacia baccata	Aug. 32	Short-roots, dichotomously branched tips of lateral roots	Thin prosenchyma fungal mantle, intercellular net, hypertrophy.
Leucothoe racemosa	Aug. 32	Coralloid	Prosenchyma fungal mantle, intercellular net, hypertrophy, cortical cells contain red granules.
Lyonia mariana	Aug. 32	Swollen short-roots, swollen tips	Prosenchyma fungal mantle, intercellular net, radially elongate cortical cells on one side, hypertrophy. Clamp connections on hyphae projecting from mantle.
Endotrophic:			
Aronia arbutifolia	Aug. 32	Swollen tips, short-roots	Intracellular granular masses, spore-like bodies.
Amelanchier canadensis	Aug. 32	Bead-like swellings and swollen short-roots	Intracellular granular masses, spore-like bodies.
Clethra alnifolia	Aug. 32	Short-roots with root hairs	Intracellular hyphae and fragments of hyphae.
Vaccinium stamineum	Aug. 32	Bead-like swellings and swollen short-roots and tips	Intracellular hyphae and fragments of hyphae.

roots. The internal structure showed the usual features, such as pseudoparenchyma or prosenchyma fungus mantles, intercellular net (Hartig's net) between the cortical cells, and hypertrophy of cells of cortical region (Fig. 1).

The hyphae projecting from the fungal mantles of two of the ericaceous shrubs namely, *Lyonia mariana* (Fig. 2) and *Kalmia latifolia*, showed clamp connections very clearly. This is, at least, an indication that these mycorrhizae are produced by association with basidiomycetes.

Quercus coccinea, *Quercus prinoides*, *Salix pentandra*, and *Sassafras variifolium* possessed, in addition to the normal coralloid form, some tuberculate mycorrhizae. These are characterized by the presence of a fungal mantle common to several mycorrhizae. In nearly all cases the mycorrhizae were well developed, a fact which may be attributed to the decidedly acid reaction of the loose quartz sandy soil.

Summary

Mycorrhizae, 29 of which were ectotrophic and 7 endotrophic have been found on 36 different trees and shrubs from Wading River region, L. I. Among these 14 are new additions to the list of mycorrhizal host plants.

Carnegie Museum

Two new species of Amsonia from the Southwest

E. J. Alexander

The southwestern Amsonias present a group where both more study and field-work are needed to clear up a not clearly understood genus. Some work has been done, and done well, but there are still points which need clearing up.

The two following proposed species stand out quite distinctly in the material which the writer has examined, but fruit of both remains to be collected, and in one case the species range contains a gap of 650 miles which is rather awkward, but quite probably due to the botanically little known region of western Mexico, where future collecting may fill in the gap or prove the Mexican plant a distinct species.

Amsonia grandiflora Alexander, sp. nov. Herba perennis glabra erecta 5–9 dm. alta; foliis alternis sessilibus vel subpetiolatis linearis vel anguste linearis, 4–12 cm. longis; corollae tubo longo subclavato 1.5–2 cm. longo; corollae lobis oblongo-ovatis 11–13 mm. longis; stigmate apici bilobato; folliculos maturis non vidi.

Arizona, Near Patagonia, May 6, 1930, Peebles, Harrison & Loomis, #6986. (U. S. 1468292). Typus.

Herbaceous perennial from a thickened, woody root; stems 5-9 dm. tall, slightly scabrate near the base, otherwise glabrous, clustered from the base, erect, somewhat branched above, the branches erect-spreading; leaves alternate, relatively numerous, the blades linear to narrowly linear, nearly sessile or with an inconspicuous petiole, glabrous, 4-12 cm. long, 2-7 mm. wide, only the lower ones more than 3 mm. wide; inflorescence paniculate, many-flowered (20-35 flowered), pedicels 1-4 mm. long; calyx 4-6 mm. long, glabrous, the lobes subulate-aristate; corolla pale greenish-blue, salver-shaped, the tube constricted at the mouth, 1.5-2 cm. long, glabrous without, the lobes 11-13 mm. long, oblong-ovate, spreading; stigma apiculate by two obtuse lobes; mature follicles not seen.

Specimens examined:

Arizona: Rio Gila, Apr. 1872, P. F. Mohr (U. S. 771287)
N. Arizona, 1873, P. F. Mohr (U. S. 771286)
Sonoika Creek s. of Patagonia, Apr. 15, 1908, Tidestrom #848 (U. S. 507142)
Tucson to Nogales, May 5, 1930, Peebles, Harrison and Loomis, #7055 (U. S. 1468312)
Near Patagonia, May 6, 1930, Peebles, Harrison and Loomis, #6986 (U. S. 1468292 [Type])

Mexico: The City of Durango and vicinity, April to Nov. 1896, E. Palmer, #90

A remarkably showy species of this genus, apparently overlooked by the recent workers who have accepted it as *A. longiflora* Torr., from which species it differs by its more numerous-flowered inflorescence, its much shorter corolla-tube, and therefore proportionately longer lobes, its more narrow and proportionately longer calyx-lobes, and even by its geographic range, not crossing to the east of the continental divide. Intermediate between the two sections of the subgenus Sphinctosiphon with the short tube of one section and the large corolla-lobes of the other.

The occurrence at Durango, Mexico of this plant causes a great gap in the range, which it is to be hoped may be filled in by future collectors.

✓ **Amsonia lanata** Alexander, sp. nov. Herba perennis tomentosa dense 2–4 dm. alta; foliis alternis brevipetiolatis ovato lanceolatis 2–4.5 cm. longis; calycis lobis subulato-aristatis, 8-9 mm. longis; corollae tubo subclavato 10-12 mm. longo; corollae lobis ovatis 8–10 mm. longis; stigmate apici bilobato; folliculos non vidi.

Nevada, Cottonwood Spring, Vegas Valley, Apr. 30, 1891; V. Bailey, Coville and Funston, #1884, (U. S. 56934). Typus.

Herbaceous perennial from a woody root, stems erect from a decumbent base, 2-4 dm. tall, densely tomentose, branched above, the branches erect-spreading; leaves alternate, the blades ovate-lanceolate, acute at the apex, cuneate at the base and short-petioled, densely tomentose, 2-4.5 cm. long; inflorescence paniculate, many-flowered (about 30-flowered in type), the branches and pedicels densely tomentose, the pedicels 2-5 mm. long; calyx 8-9 mm. long, tomentose, the lobes subulate aristate; corolla salver-shaped, the tube clavate, constricted at the

mouth, 10-12 mm. long, glabrous without, the lobes 8-10 mm. long and 4-5 mm. wide, ovate, spreading; stigma apiculate by two obtuse lobes; follicles not seen.

Type: Cottonwood Spring, Vegas Valley, Nevada; V. Bailey, Coville & Funston, Apr. 30, 1891, #1884 (U. S. 56934).

Most nearly related to *A. tomentosa* Torr., but differing in the much larger flowers with differently shaped corolla-limb, and in the longer calyx-lobes which are more than half the length of the corolla-tube.

To all appearances this must be fully as showy a plant when in flower as the preceding.

New York Botanical Garden

Some new oaks from Western Texas

C. H. Mueller

During the summers of 1931, 1932, and 1933 the author made a study of the vegetation of the Chisos Mountains of Western Texas. Certain inconsistencies in the identification of the oaks collected and those already in the herbarium of the University of Texas suggested a need for further study of that group. While making a special collection for this purpose the author came upon material which confirmed earlier suspicions of one or more undescribed species.

Both species herein described have been referred to *Quercus texana* var. *chisosensis* Sarg., and it was not until a collection of mature fruits was made that the several other smaller differences could be recognized as critical. It has been found that the material collected not only does not agree with Sargent's description of *Quercus texana* var. *chisosensis* but also differs from the typical examples of that variety found growing abundantly over the mountains.

Quercus robusta Mueller, sp. nov. Ramuli graciles dense breviterque stellato-pubescentes aut demum glabrati; gemmae 1.5 mm. crassae 3–4 mm. longae ex oblongis acute ovoideae; folia decidua coriacea, auctumno non rubescentia, late lanceolata del acute ovatae, basi rotundata, late cuneata, truncata, vel leviter cordata, 2.5–5 cm. lata, 6–11 cm. longa, dentibus 8–10 setaceis, pubescentia pilis fasciculatis utrinque persistentibus; petioli 0.5–1 mm. lati, 10–20 mm. longi, stellato-pubescentes; fructus annuus solitarius breviter pedunculatus; cupula parva; glans oblonga fere cylindrica, apice rotundata, 8–10 mm. crassa, 17–22 mm. longa, puberula, ad partem circa tertiam inclusa.

Quercus robusta differs from *Quercus texana* var. *chisosensis* chiefly in its almost cylindrical fruit, the stiff, heavier branchlets, and the stiff, coriaceous, pubescent leaves which do not turn red in autumn. Apparently its alliance is with typical *Quercus texana* Buckl.

Quercus robusta Mueller, sp. nov. Twigs somewhat slender (2 to 3 or rarely only 1.5 mm.), obscurely fluted, densely short stellate hairy the first year or late glabrate, dark red-brown be-

coming grey in the second year, numerous small lenticels (evident when not covered with pubescence); buds 1.5 x 3 to 4 mm., oblong to acutely ovoid, glossy brown, the scales ciliate; leaves deciduous, stiff, coriaceous, dull green, not becoming crimson in autumn, broadly lanceolate to acutely ovate, often long attenuate (by the elongation of the terminal lobe), rounded at the base, frequently broadly cuneate, truncate, or even shallowly cordate, setaceously 8-toothed, the terminal pair often so reduced as to become a part of the terminal lobe, with deep rounded sinuses, usually unequally lobed, moderate in size (2.5 to 5 x 6 to 11 cm.), fascicled hairs persistent especially above and along the midrib beneath, frequently one or two denser axillary tufts beneath; veins branching but hardly looped, scarcely raised above but prominent beneath, usually alternately passing into the lobes; petiole slender (0.5 to 1 x 10 to 20 mm.), stiff, stellate hairy or finally glabrate, dark red at the base shading into straw color above, dorsally flattened; catkins ?; fruit biennial, solitary, or, if paired, one usually not developing fully, the mature fruit borne on a short peduncle (2.5 x 5 or 6 mm.) or subsessile; cup small (about 12 mm. in diameter and 8 mm. in depth); scales thin, apressed, somewhat elongated and narrowly rounded at the apex, light brown, ciliate, and densely pubescent dorsally with silvery white hairs which are readily rubbed off; acorn oblong, almost cylindrical, broadly rounded at the apex, about 8 to 10 x 17 to 22 mm., finely dense pubescent, with longitudinal dark markings, one third or more included.

A large tree with low, wide spreading main branches, stiff young branches, and dark grey or black bark roughly furrowed, the trunk as large as 1 m. in diameter, the crown about 10 to 12 m. high and about 15 m. broad.

The type (Mueller no. 567) was collected August 25, 1933 in very moist Oak Canyon in the Chisos Mountains at an altitude of about 4200 feet and is deposited in the herbarium of the University of Texas at Austin.

Quercus graciliformis Mueller, sp. nov. Ramuli gracillimi mox glabrati; gemmae 1–1.5 mm. crassae 1.5–2 mm. longae ovoideae; folia decidua anguste lanceolata, 2.5 cm. lata, 8 cm. longa, basi cuneata, mox glabrata, rariter in axillis venarum subtus pilosa, dentibus 8–10 setaceis; petioli glabrati 0.5 mm.

crassi 15–20 mm. longi; fructus biennis solitarius vel geminatus subsessilis; cupula parva tenuissima; glans acute avoidea puberula, 10 mm. crassa 18 mm. longa, tantum basi inclusa.

Quercus graciliformis exhibits definite alliance with the Acutifoliae of Northeastern Mexico. It differs from *Quercus Canbyi* Trel. in having biennial fruit with acorns enclosed only at the base and leaves with more numerous lobes. A part of the material referred to var. *parvilobata*, however, can be distinguished from *Quercus Canbyi* only by the fruit. *Quercus graciliformis* differs from *Quercus texana* var. *chisosensis*, to which it has been erroneously referred, in the characters of the section Acutifoliae to which it belongs.

Quercus graciliformis Mueller, sp. nov. Twigs very slender (1.5 mm. or less), fluted, quickly glabrate, deep glossy red to brown, grey in the second year, few small buff lenticels hardly evident; buds small (1 x 1.5 to 1.5 x 2 mm.), ovoid glossy brown, the scales ciliate; leaves deciduous, narrowly lanceolate, long attenuate, cuneate at the base, setaceously 8 to 10-toothed with somewhat deep rounded sinuses (rarely very shallow), often unequally lobed, moderately small (2.5 x 8 or sometimes 3 x 8 or 2 x 10 cm.), soon glabrate, entirely smooth or very rarely an axillary tuft beneath, glossy green above, more dull beneath; veins fine, often branching but rarely looped, scarcely raised above, more prominent beneath, usually passing alternately into the teeth; petiole glabrous, deep red at the base shading into straw color, dorsally flattened, very slender (0.5 x 15 to 20 mm.), soft flexible; catkins ?; fruit biennial, solitary or sometimes paired, subsessile; cup small (scarcely 10 mm. in diameter), shallow about 3 mm. deep); scales thin, appressed, narrowly rounded at the apex, light brown, ciliate, white pubescent along the mid-dorsal area; acorn acutely ovoid, about 10 x 18 mm. at maturity, finely dense pubescent, with longitudinal dark markings, enclosed only at the base.

A small tree 6 to 8 m. high with long, slender, flexible branches and grey, furrowed bark, the trunk rarely over 0.3 m. in diameter.

The type (Mueller no. 565) was collected August 25, 1933 in Blue Creek Canyon in the Chisos Mountains at an altitude of about 5500 feet and is deposited in the herbarium of the University of Texas at Austin.

With more persistent pubescence, shorter and reduced number of teeth, shallower sinuses, rounded leaf bases, shorter petioles (about 10 mm.), smaller leaves (about 1.5 x 5 cm.) with margins 1 to 8-toothed, entire or merely crisped, this becomes var. *parvilobata;* (Mueller nos. 566a, 566b, and 566c collected August 25, 1933 in the type locality of the species). This is a very variable form, grading into the type in any or all of the characters by which it is differentiated.

Series of specimens designated as co-types of the above two species and variety are deposited in the following herbaria: Arnold Arboretum at Jamaica Plain, Mass.; University of Illinois at Urbana; Field Museum of Natural History at Chicago.

The author wishes to make grateful acknowledgement of the aid of Dr. Wm. Trelease who examined the material and offered suggestions as to its affinities with other species and groups.

University of Texas

BOOK REPORT

In "Economic Plants"[1] Dr. Stanford has presented a very readable and informative account of plants in their economic relation to man. Beginning with the major and minor forest products of lumber, resins and rubber, he leads the reader through all the great groups that furnish textiles, paper, cereals, sugar, oils, proteins, fruits, spices, beverages, and finally medicines. This account, well illustrated with 376 figures, is a delightful source of information to the general reader. It is to the student, however, that the book should have its greatest appeal for in it are presented those aspects so frequently omitted in most academic training, the correlations between the teachings of plant physiology and anatomy, and the utilization of plants.

E. H. Fulling

FIELD TRIPS OF THE CLUB

Trip of August 5 to Cold Spring Harbor, L. I.

Proceeding westward along the railroad, we skirted a stand of black oak woods, where the characteristic undergrowth has completely covered the railroad cut: *Vaccinium pennsylvanicum*, *V. vacillans*, *Gaylussacia baccata* with black berries or with glaucous ones, various mosses, and the lichen, *Baeomyces roseus*. A springy seep at the north base of the railroad bank yielded *Hypericum canadense*, *Rhexia virginica Rhynchospora glomerata*, *Lycopodium inundatum*, *Apios tuberosa*, and mosses, *Anthoceros laevis*, *Nardia crenulata*, *Aulacomnium palustre* and *Pohlia proligera*. In the sandy margin of an old field north of the depot *Polytrichum commune* and *P. piliferum* were distinguished along with *Chrysopsis falcata*, *Gnaphalium polycephalum*, *Lactuca spicata*, *Eupatorium hyssopifolium*, *Euphorbia ippecacuanhae*, *Hypericum gentianoides*, *Asclepias amplexicaulis*, *Deschampsia flexuosa*, etc. On the side of a newly cut road bank was exposed a layer of woodland soil covered more than fifty years ago in grading for a projected railroad. There is an opportunity to study the survival of seeds and spores in subterranean storage. Along the sandy roadside there is abundance of *Diodia teres*,

[1] Stanford, E. E., Economic Plants. Pp. 571, figs. 376. D. Appleton-Century Company Inc., New York, $5.00.

listed some years ago by Norman Taylor as one of the little known plants of Long Island, *Aristida tuberculata*, and *Trichostema dichotoma*.

Thence the old unused railroad bed was traversed to the Biological Laboratory for dinner. After dinner the laboratories were briefly visited, and the Datura display of the Carnegie Laboratory was explained by Dr. Cartlege. Dr. Blakeslee, former president of the Club, spoke to us there.

A walk across the salt marsh on a gravel path yielded *Scirpus robustus*, *S. americanus*, *Typha latifolia*, *T. angustifolia*, *Aspidium thelypteris*, *Hibiscus moscheutos*, *Iva oraria*, *Distichlis spicata*, *Juncus gerardi* and *Spartina patens* in glorious contrasting tints of velvety meadow, *Limonium carolinianum*, *Solidago sempervirens*, *Buda marina*, *Plantago decipiens*, *Spartina glabra alterniflora*, and the algae *Ulva latissima*, *Enteromorpha intestinalis*, *E. clathrata*, *Ascophyllum nodosum* and *Fucus sp.*

The New York State Fish Hatchery furnished a fine display of water-loving mosses and liverworts: *Amblystegium irriguum*, *Chiloscyphus rivularis*, *Brachythecium rivulare*, *Climacium kindbergii*, *Fontinalis novae-angliae* and *Marchantia polymorpha*. The shores of St. John's Pond proved rich in liverworts, mosses and vascular plants: *Gratiola aurea*, *Hypericum virginianum*, *Callitriche palustris*, *Lycopodium lucidulum*, *Woodwardia areolata*, *Riccia fluitans*, *Lophocolea bidentata*, *Odontoschisma prostratum*, *Pallavicinia lyellii*, *Georgia pellucida*, *Dicranum flagellare*, *Hypnum imponens*, *Bryhnia novae-angliae*, *Drepanocladus exannulatus*.

The route to the Laboratory covered about three miles. We were mostly in the oak-chestnut forest of Shantz & Zon, first in the dry black oak phase and then in the more mesic chestnut oak phase with Kalmia latifolia. At the moist cool margin of St. John's Pond we have a fragment of the birch-beech-maple-hemlock forest of Shantz & Zon, with *Betula lenta* abundant and a considerable amount of beech and *Betula lutea*. The moist areas of these formations furnished our hygrophilous flowers and mosses. Finally, the salt marsh gave us the marginal maritime vegetation of a protected saltwater cove. These numerous vegetational zones account for the richness of the flora in so short a hike. A half mile more would have taken us into the beech-grass (Ammophila) association, but time was limited.

HENRY S. CONARD

NEWS NOTES

Dr. T. D. A. Cockerell, professor of zoology at the University of Colorado for the last twenty-eight years and a frequent contributor to Torreya, retired from the University this summer with the title of professor emeritus.

At the Berkley meeting of the American Association for the Advancement of Science last June Dr. O. L. Sponsler, of the University of California, was elected president and Dr. Flora Murray Scott, also of U. of C., secretary-treasurer of the Pacific Section of the Botanical Society of America.

At the commencement exercises at Colgate University in June the degree of doctor of science was conferred on Dr. William F. Langworthy, who retired from the chair of botany at the university. (Science)

Dr. M. F. Barrus, professor of plant pathology at Cornell University, sailed for Porto Rico on June 28. He has been given two years' leave of absence to take charge of the reorganization of agricultural extension at the Insular Experiment Station, Rio Piedras. Dr. P. P. Pirone, formerly in charge of Dutch elm disease eradication in Nassau County, Long Island, has been appointed acting extension assistant professor of plant pathology during the absence of Dr. Barrus. (Science)

Dr. Karl Frederic Kellerman, bacteriologist and executive of the U. S. Department of Agriculture, died on August 30, in Washington. Dr. Kellerman came to the Federal Department of Agriculture as an associated physiologist in the Bureau of Plant Industry in 1901. His work in connection with the physiology of lower plants, especially those of importance with relation to potable water supplies, and his studies in nitrifying bacteria for which he developed a synthetic medium that is the foundation of all successful work in this field since that time, led to his rapid advancement, and in 1914 he was appointed assistant chief of the Bureau of Plant Industry.

In the reorganization of the Department in 1933 Dr. Kellerman took general charge of all the regulatory work associated

with plant diseases and also with the important campaigns in disease eradication. In 1913 he organized the Journal of Agricultural Research and for ten years was chairman of the editorial committee.

Dr. Kellerman was born in 1879 at Gottingen, Germany, of American parents and was brought to this country by his parents when a year old. He graduated from Cornell University in 1900.

An expedition has been sent to Central Asia by the U. S. Dept. of Agriculture to find superior drought-resisting pasture grasses.

"As leader in charge of the expedition to the Hingan Mountains and the plains adjoining the Gobi, the Department of Agriculture has secured the collaboration of Prof. Nicholas Roerich, the internationally recognized authority on Central Asia. For the last eleven years Prof. Roerich has made extensive expeditions into Sikkim, Kashmir, Tibet, Chinese Turkestan, Mongolia, the Gobi desert and the Altai region where his exhaustive studies of the scientific and cultural backgrounds of the entire Asiatic field have been second to none. Since 1929 he has also been interested in botanical expeditions into western Tibet, studying especially the medicinal plants of this region.

"Accompanying Prof. Roerich are his son, George Roerich, an expert on Central Asiatic tongues, and H. G. MacMillan and J. L. Stephens of the Bureau of Plant Industry, who are fundamentally trained in the study of American grasses."

Secretary Wallace states that "On the edge of the Gobi desert in Central Asia are great pasture lands where the summer temperatures often go above 100 degrees and the winter temperatures more than 40 degrees below zero. The rainfall in this area is less than 16 inches annually but apparently there are certain pasture grasses which through thousands of years of natural selection have learned to adapt themselves to an environment as severe as that of our Great Plains states this past year. These grasses are presumably able to go dormant in times of great drought, heat and cold, and then spring very rapidly into growth under the influence of summer and fall showers.

Secretary Wallace has formally designated the field activities at Beltsville and at Bell, Md., as the "Beltsville Research Cen-

ter of the Department of Agriculture" and named Dr. E. N. Bressman as temporary director. This action brings together under one administrative head most of the field activities of the Department in the vicinity of Washington. The Beltsville Research Center, comprising about 4500 acres, about 15 miles northeast of Washington, is destined to be developed as the principal experimental area under control of the Department and as the largest and most completely equipped plant for the scientific study of agriculture in this country.

The ten bureaus now assigned to conduct work in this area are: the Bureaus of Animal Industry, Plant Industry, Dairy Industry, Agricultural Engineering, Entomology and Plant Quarantine, Chemistry and Soils, Agricultural Economics, and Biological Survey, and the Food and Drug Administration and the Forest Service.

The Department plans ultimately to relocate at Beltsville many of the activities which have been under way at the Arlington Experimental Farm just south of Washington.

For the school year, 1934–5, the Brooklyn Botanic Garden announces a wide variety of courses for the public, for teachers, and for children. These courses comprehend such subjects as House Plants, their Care and Propagation; Gardening, Indoors and Out; the Arrangement of Flowers; the Evolution of Plant Families; Economic Plants; Nature Study; and Medicinal Plants. In addition, out-of-door, or "field" courses are announced, to give practice in the identification of the trees, shrubs, and flowering plants that are cultivated or grow wild in the parks and woodlands of Greater New York and vicinity.

Dr. E. P. Phillips, of the National Herbarium, Pretoria, South Africa, under grants from the Carnegie Corporation and from certain South African organizations, is making a study of the botanical institutions of the United States. (Science)

Dr. Charles Baehni, assistant at the Botanical Garden of Geneva, Switzerland, is now at the Field Museum of Natural History, Chicago, where he plans to spend a year in botanical research. (Science)

Professor Y. Yamamoto, of the Taihoku Imperial Univer-

sity, Taihoku, Formosa, is spending the summer months at the New York Botanical Garden studying specimens from the Augustine Henry collection of Formosan plants. This collection, made during the latter part of the nineteenth century, is the one on which the first enumeration of Formosan plants, published in 1896, was based. (Science)

Dr. J. M. Aikman, associate professor of botany at Iowa State College, has been given leave of absence to become senior botanist in the shelter belt project of the U. S. Department of Agriculture.

The appointment has been announced of Frederick D. Richey as chief of the Bureau of Plant Industry to succeed Knowles A. Ryerson. Mr. Ryerson will resume his earlier work with citrus fruits, avocados, dates and other tropical fruits, heading a section of subtropical horticulture in the Department. Mr. Richey has been in the Bureau of Plant Industry for more than 23 years and was appointed associate chief of the Bureau on January 1 of this year.

Dr. Fredrica Detmers, sixty-eight years old, curator of the herbarium at the University of Southern California died in Los Angeles on September 5th. She had come to the university from Ohio State University. She was regarded as an authority on native grasses.

Norman Taylor, Editor of Torreya from 1911 until 1921, and editor for botany of the new Webster's Dictionary, has been engaged by Houghton Mifflin Company as editorial and promotion adviser in the field of garden books and those in the realm of natural science and outdoor life. Mr. Taylor will be at the New York office of the company.

Professor H. H. Love, of the department of plant breeding at Cornell University, has returned from the Orient after a stay of three and a half years. Professor Love went to China to serve as adviser in agriculture to the Ministry of Industries, to direct crop-improvement work in the provinces of Kiangsu and Chekiang, and to train Chinese in this work at the University of Nanking and the National Central University of Nanking.

THE TORREY BOTANICAL CLUB

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Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
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BY
GEORGE T. HASTINGS

John Torrey, 1796-1873

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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Some Botanical Notes From the Land of Flowers

Julius M. Johnson

Much reading of separates, by a well-known authority on the plants of Florida, had whetted the writer's botanical appetite to a razor-edged keenness. When the opportunity came to appease that hunger the few meals only increased the desire for more. It will take many more trips to the land of flowers, tourists and real-estate projects before a surfeit becomes a possibility.

As is usual when man touches nature there is a devastation on every side, some of it inevitable in the settlement of the land and much of it due to indifference, carelessness and worse.

So extensive has this destruction of native flora been that some far-sighted people have already set aside certain typical areas that future generations may get some idea of the richness of plant life in its primeval condition. The Royal Palm State Park, near Cape Sable, and Matheson's Hammock, a few miles from Miami, are good illustrations of this movement. Some state forest areas in the northern part of the state may help in this good work.

Aside from the cultivation of large areas for garden truck and citrus fruit, perhaps the most destructive agent is uncontrolled fires, especially in the pine lands which, together with the everglades, occupy a large part of the state. The nature lover and even the casual tourist is appalled at the recklessness of the burning. Fires are deliberately set and allowed to burn themselves out regardless of the effect upon the scenery or the vegetation. Although the larger pine trees and palms are not killed there are few, or no, young trees to replace the old as all the undergrowth is destroyed. The result is that there is hardly a real pine forest in the whole of central and southern Florida. Some of this burning is necessary for the clearing of the land but a large part of it is unnecessary.

Very extensive drainage has also seriously damaged the primeval flora and fauna. Much of this has been unnecessary and is a great tax on the people of the state. Millions of acres are unused and will be idle for many years to come.

The writer confined his studies largely to the southern part of the state with short excursions into the central part. For convenience the flora will be discussed according to the kind of territory occupied and not in regard to scientific relationships.

Coastal Plants

The seaside and sand dune plants are unique, and run over the sand almost to the line of high tide. Many of the plants blossom for a considerable part of the year but are at their best

The Sabal Palmetto is abundant in the coastal regions of central and southern Florida. View near Fort Lauderdale.

for only two or three months, frequently the late winter, spring and early summer seasons. Many of the species are confined to a certain habitat, others may be found flourishing in two or more.

It is quite a surprise to find that our common smartweeds of the Buckwheat family are represented on the sandy coast region by a tree twenty feet high. The ocreae at the nodes indicate its relationship at once. The leaves are nearly circular with

a shallow notch at the tip. The tiny whitish blossoms are in a long slender upright spike to which the bees are strongly attracted and a low continuous humming is always associated with this tree when in flower. This is the Sea-Grape, *Coccolobis uvifera*, found in the tropical and semi-tropical regions of the New World.

Another tree which is almost universal in southern and central Florida is the Cabbage Palm, *Sabal Palmetto*. The name is given because the large terminal bud may be used as a salad. It is rather tasteless and is little used. The tree is of the fan palm type and grows to a height of twenty to thirty feet and one to one and one-half feet in diameter.

Very striking are some of the morning glory family. The Goat's-foot Vine, *Ipomoea Pes-Caprae*, because of its very long thick stem which runs for twenty feet or more over the sand almost to the high tide mark and its very thick wide leaves, notched at the end, which have a superficial likeness to a goat's foot. The flowers are purple and as large as the cultivated morning-glory. Climbing over the shrubbery and running over the sand, not only along the shores but in many other parts of the region, is the large Purple Morning-glory, *Pharbitis purpurea*. Most striking of all, because of its blossoms, is the Moonflower, *Calonyction aculeatum*, with its very large salver-shaped flowers. The tubes are about six inches long expanded at the top to a width of four to five inches. It is white and opens only at night. This fact may account for its name, Moonflower.

The Dune Sunflower, *Helianthus debilis*, with its yellow blossoms one and one half to two inches broad, is common, but, unlike our forms of this genus, it is procumbent and forms a fairly good cover to keep the sand from drifting. Scattered among the sunflowers one often sees small white flowers on very prickly stems, with broad lobed leaves protected in the same way. If we step on them with bare feet on our way to the bathing beach we realize that the name, Tread-softly, is well applied. The scientific name of this plant is *Bivonea stimulosa*. The effect is like that of our own nettles only more so. A plant only six inches high may have a spindle-shaped root a foot long going straight down into the ground. It is said that the natives formerly ate it for the stimulating effect it had on them. Probably the species name, *stimulosa*, was applied for this reason.

Although nettle-like in its character, it does not belong to the nettle family but to the Euphorbia family and is sometimes called Spurge-nettle.

On returning from a stroll one usually finds his trouser legs roughly patched with medium-sized ovate green leaves, whole or in fragments. Sometimes parts of stems accompany the leaves. It is a tedious task to remove them as the whole surface is held tightly to the cloth by numerous barbed prickles and the blade itself is so tender that only a little can be removed at a time. It is best to let the leaves dry when they can be removed by vigorous brushing. If one searches for the source of his Poor-man's Patches, *Mentzelia floridana*, one discovers a low branching plant with yellow flowers about three quarters of an inch broad.

On the sand dunes, along the canals, in abandoned cultivated fields and almost everywhere on dry ground a medium-sized white flower with a yellow center is very abundant. As one walks among them one finds his clothing covered with spindle-shaped brown objects about one quarter of an inch long with two to four barbed prickles at the broader end. We call similar fruits in the north, Beggar-ticks, but these are named Spanish or Shepherd's needles, *Bidens pilosa*.

Walking in the low herbage in sandy soil one often hears a sound like that of a baby's rattle. The cause is a low plant with a yellow blossom about one-half inch broad and shaped like a sweet-pea flower. The plant has pods like those of the common cultivated pea but smaller. As they become dry the seeds rattle whenever the pods are touched. This is the Rattle-box, *Crotalaria pumila*, or some similar species.

From the standpoint of usefulness one of the most interesting plants in the dune region—but more abundant in the dry sandy pine land—is the Coontie, Florida arrow-root or Wild Sago, *Zamia integrifolia*, belonging to the cycads. They are easily mistaken for ferns. The seeds are borne in a cone like structure at the base of the cluster of stiff leaves. This plant represents the lowest of the seed-bearing plants and is a sort of connecting link between them and ferns. The long thick underground stem from which the leaves spring is full of starch which furnished a large part of the food of the Seminole Indians and

the aborigines before them. Now it is sold under the name, Florida arrow-root.

Perhaps the most striking tree, both because of its abundance and its general appearance, is the Australian Pine, *Casuarina equisetifolia*. It has been introduced everywhere along the coast and flourishes particularly well in the dry coral sands. The resemblance to a pine is only superficial as it has not true needles. The very slender green branches give the appearance of needles when seen from a distance but, closely examined, show a structure much like our common Horse-tail Rush, hence the specific name, *equisetifolia*.

Often plants are striking because of their manner of growth and not by the brilliance of their blossoms. This is the case of a leguminous shrub with no common name, *Ecastophyllum Brownei*. It is very bushy, but also sends out thick green runners often twenty feet in length, lying flat on the ground. It has axillary panicles of small white flowers. Although the leaves are compound there is only one leaflet, which is indicated by a joint between the blade and the leaf stem.

The beautiful Day Flower, *Commelina augustifolia;* Prickly Pear, *Opuntia austrina*, with large yellow blossoms; a pretty matting Verbena; a Helitrope with *white* blossoms; and two small species of Poinsettia, unmistakable because of their close likeness to our much larger one used for Christmas decoration, are among other common shore and dune plants.

The Piney Woods

The pine forests of Florida are a disappointment as forests but they are full of interest for the botanically inclined. The pines are principally of three species, the commonest being the Long-leaf, *Pinus australis*, with three very long needles to the cluster; next the Slash Pine or Caribbean Pine, *Pinus caribaea* which prefers calcareous soil and is particularly abundant in the southern part of the state; and, third, the Spruce Pine, *Pinus clausa*. The Slash Pine has two or three needles to a cluster, shorter than those of the Long-leaf. The Spruce Pine has needles only two to three inches long and only two in a bunch so that it may be easily identified as one rides along the road.

In general the trees are so far apart that abundant sunlight

reaches the ground resulting in a plentiful undergrowth of shrubs and rather scanty grass. One is impressed with the rusty appearance of this undergrowth. An investigation shows that it is due to the abundance of scrub oaks of several kinds, Chapman's Oak, *Quercus Chapmani*, and a Live Oak, *Quercus geminata*, being the most common in many places. The shrub, one of the Staggerbush group, *Xolisma ferruginea*, adds greatly to this effect as it is often plentiful.

In this growth the Saw Palmetto, *Serenoa repens*, is perhaps the most conspicuous as it forms dense patches. Its prostrate stems curve over the ground like great rough-skinned pythons. They rear their heads in tufts of fan-shaped blades on long saw-toothed stems to a height of five or six feet making an almost impenetrable mass.

An evergreen shrubby St. John's-wort, *Hypericum aspalanthoides*, is conspicuous with its orange yellow blossoms and clusters of needle-like leaves, which remind one of those of the larch.

The mint family is not usually associated in our minds with shrubs, yet here in the "piney woods" is a heath-like shrub of this family with short needle-like whorled leaves. The blossoms are one-half inch long, pale purple with darker spots. This is *Conradina grandiflora*.

Not only is St. John honored in the "piney woods" but St. Peter as well in the form of St. Peter's-wort, *Ascyrum tetrapetalum*. In this rather low shrub the four petals are bright yellow. The sepals are unusual in that the two outer are broad ovals while the two inner are elliptical. Here again we have clusters of short needle-like leaves.

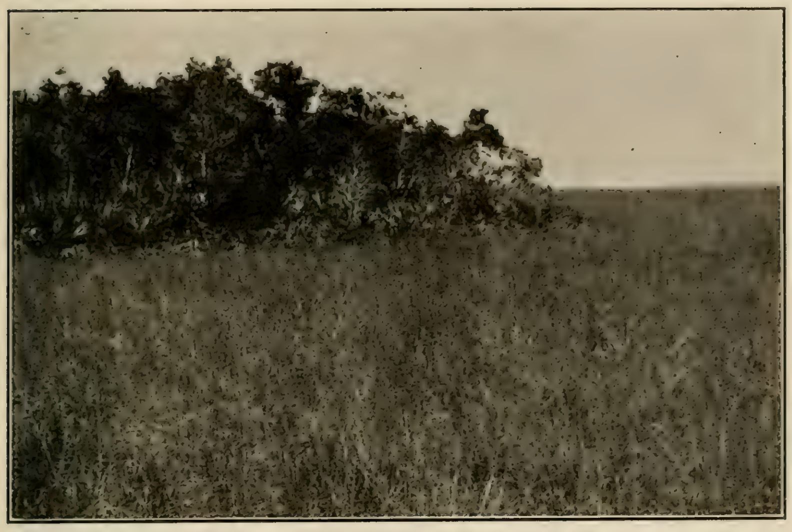
Rabbit-tobacco, *Pterocaulon undulatum*, a composite with nearly cylindrical long heads of small white blossoms; a large yellow milkwort, *Polygala Rugelii;* a *yellow* heliotrope, *Heliotropium Leavenworthii;* and a blueberry, *Vaccinium nitidans*, are a few of the many other plants which add beauty and interest.

It is in the "piney woods" that the Florida Jay dwells. It is darker blue and less noisy than our Jay and has no crest. There, too, we find the Pine-woods Sparrow, some parts of its attractive song suggesting the song of a thrush. The White-eyed Towhee finds a congenial home in the low bushes and searches for food by scratching away the vegetable debris on the ground.

Everglade Plants

Perhaps no part of Florida is better known by reputation than the hundreds of thousands of acres of low, level, grass-covered wet areas of southern Florida called the Everglades. We have read how they have been drained for truck gardening and of the fires which have rendered great sections useless by destroying the soil down to the limestone.

To the naturalist it is a fascinating region because of its plant and animal life. Herons and other large marsh birds roam



A typical Everglade landscape showing a hammock. Near West Lake, west of Royal Palm Hammock State Park.

over the broad expanse in thousands. Snakes, turtles and amphibia abound. The typical Everglade surface does not have a varied plant life as few plants other than Saw-grass, *Mariscus jamaicensis*, may be found over extensive areas. However, when one considers the variety of habitat included in the whole Everglade region, the number of species is very great. Many species have come in along the drainage canals.

Scattered through much of the area are slightly raised drier sections, from a few to many acres in extent, known as hammocks—sometimes called keys in the southern region. Indeed

they strongly resemble in distinctness the island keys in the water to the south of the mainland. To the north the typical Everglade country gradually merges into the somewhat drier terrain of the prairie. To the west and northwest it becomes cypress swamp. Only a few of the common plants one sees in driving along the canals can be mentioned here.

Springing up here and there in the Saw-grass is the Groundsel tree, *Baccharis hamilifolia*, and, *B. glomerulifolia*. The former is common in our northern salt marshes. It is one of the few shrubs of the composite family. Marsh Fleabane, *Pluchea purpurascens*, is a common herb with compound blossoms of a purplish color. It so closely resembles our own species that it is easily recognized.

Growing in the shallow water of the canals and in the small ponds of the Everglades is our familiar Pickerel Weed or Wampee, *Pontedaria lanceolata*, with its spikes of bright blue flowers while contrasted with it is Arrow-head, *Sagittata lancefolia*, bearing a tall cluster of large white blossoms. The large leaves give the plant its common name.

In many parts of the canals the water is completely covered with a dark green mass of Water Hyacinth, *Piaropus crassipes*, a cause of sulphurous language to the boatman but a pleasure to the eye of the nature lover. Its roots hang suspended in the water and a large cluster of pale blue flowers arises from the short stem. Wild ducks eat the foliage eagerly. In other parts our common Spatter-dock or yellow Water-lily, *Nymphaea advena*, covers the water with its large, rather coarse yellow blossoms.

In the more prairie-like parts of the Everglades many acres may be covered with various species of Sabbatia, many of them with large delicate pink blossoms in striking contrast to the grass in which they are scattered. Other species are smaller and some have white flowers.

Perhaps the most striking of all is the Alligator Lily, *Hymenocallis*. It is easily recognized by its very large and peculiarly shaped white blossoms. The lobes of the perianth are very long and narrow rising from a tube four inches or more long, the whole blossom being eight inches across. The bases of the stamens are connected by a broad membrane.

Not only in the Everglades but also in almost any low, open,

wet place, one's attention is attracted by a rather large scraggling plant with large yellow blossoms with four petals and a long red calyx with short lobes. The stems are reddish also. One knows at once that it is an evening primrose but what a giant as compared with our northern forms. The willow-like shape of its leaves helps to give it the common name, Primrose Willow, *Jussiaea peruviana*.

Hammock Vegetation

Space does not allow me to attempt a description of the hammock vegetation. It varies greatly in different parts of the state. In the southern part, however, it is usually made up of deciduous trees and shrubs with some palms of different species interspersed. Ferns are often common and epiphytes of various species are to be found. In origin many of the plants are tropical or subtropical, coming largely from the West Indies. A description of this flora would require a large volume.

Besides the two species of palms to which reference has already been made, there are several other kinds, some of which are of rather limited distribution. All along the coast of the southern part of the peninsula and, to some extent, inland, the Coconut, *Cocos nucifera*, is, perhaps, the most graceful and attractive. In some places it forms groves of considerable size. Its tall, somewhat sinuous trunk and its tuft of immense feather-shaped leaves add the tropical touch so much desired.

The Royal palm, *Oreodoxa regia*, is second only to the Coconut in desirability and some give it first place. Many of these, fifty feet tall, growing in the wilderness, have been dug up and transported on huge trucks to hotel and exclusive club grounds where they are planted and flourish. They grow ninety to one hundred feet tall. Their massive light-gray trunks have a stately columnar effect which is used to advantage on formal landscapes. In all there are about thirteen native species of palms and one hundred and nineteen introduced forms.

To one who has never visited a tropical coast the common Mangrove, *Rhizophora Mangle*, is rather repelling at first. Its thick masses of dark-green foliage; its habitat of black slimy mud which is covered with water at high tide; and the fact that it hides the real shore line does not invite a close investigation. Like some reticent people, however, it is full of interest on

closer acquaintance. The slender trunks are light gray and raised above the surface of the ground on a coarse network of roots making it very difficult to walk among them. Aerial roots are sent down from the branches making the task still greater. But most interesting of all is the method of reproduction. The pendulous fruit is about an inch long and germinates while attached to the parent plant, sending out a radicle a foot or more long. After a time the whole structure falls, floats in an upright position and takes root when stranded. Much of the coast from Fort Lauderdale, around Cape Sable, and as far north as Fort Myers on the west coast, is fringed with this growth. Many square miles of the Cape Sable region is overgrown with it and it penetrates the southern edge of the Everglades for miles, gradually petering out to the north. The yellow blossoms, about two-thirds of an inch long, are not especially attractive except in masses.

The White Mangrove or White Button-wood, *Laguncularia racemosa*, is often found growing with the common species and is not readily distinguished from it at a distance. It is not a true mangrove and belongs to quite a different family. Its white flowers are very fragrant. Still another tall shrub called the Black Mangrove, *Avicennia nitida*, is found in pure stands and growing with the other two. It also is not a true mangrove. It grows much larger than the others, reaching a height of seventy-five feet. The white flowers are somewhat mint-like in structure and show the close relationship of the two families.

The plants, briefly described here, gave me only a taste of the rich botanical feast which I may enjoy in future trips which I hope to take.

RIDGEWOOD, N. J.

Flora of the State Park, Orient, Long Island, N. Y.

Roy Latham

Long Beach, Orient, Long Island, the site of a new State Park, is a peninsula connected at the easterly end with the main body of Orient and thence extending in a westerly direction for approximately three miles between Gardiner's Bay on the south and Little Bay, Eagle Neck channel, Long Beach Bay, Peter's Neck channel and Peconic Bay on the north. The tract terminates on the west in a sandy spit known as Long Beach bar. On this point is situated one of the largest tern colonies in the state, where two species breed, the Common and Roseate Tern.

The approach to the park from the east is a narrow beach between two bays. This beach is vegetated by clumps of sand-reed, *Ammophila arenaria*, dwarf, prostrate shrubs of beach plum, *Prunus maritima*, red cedar, *Juniperus virginiana*, spurge, *Chamaesyce polygonifolia*, and various other maritime weeds, principally adventive. Along the Little Bay margin, on the west, occur salt-marsh spurry, *Tissa marina*, glasswort, *Salicornia*, and a rank growth of smooth salt marsh-grass *Spartina stricta*. This approach to the park has been elevated by loam and the causeway has altered or obliterated many of the natural conditions on this neck.

The park proper broadens in series of westerly ridges of sand and gravel; between these ridges are depressions of salt marshes and salt water ponds. About midway of the length is a narrow neck of beach known as the Narrows. The two sections are known locally as East and West Long Beach. The larger of the ponds in the east section is known as the East Pond and the largest in the west section as the West Pond. The interesting ruins of a fertilizer factory, which operated in the eighties, lie between the West Pond and the tern colony.

Parallel with the Gardiner's Bay shore on the south is a higher level of beach sand and gravel. The characteristic flora on this southerly exposure are beach sandwort, *Honkenya peploides*, wild pink, *Silene caroliniana*, beach pea, *Lathyrus maritmus*, wild rose, *Rosa virginiana*, false heather, *Hudsonia tomentosa*, beach pin-weed, *Lechea maritima*, coast jointweed, *Polygonella articulata*, *Prunus maritima*, poison ivy, *Toxico-*

dendron radicans, bayberry, *Myrica carolinensis*, cactus, *Opuntia Opuntia*, and *Juniperus virginiana*. The red cedar here, especially where it is under the influence of the strong sea winds, forms a prostrate growth of unusual interest. Plants of the cedar of only three to six feet in height have a diameter of ten to a maximum of nearly fifty feet and are quite circular in form. Some of these trees are very old and fruit heavily, affording abundance of food and shelter for birds which commonly winter there. It is to be regretted that the constructors of the development of the park saw fit to trim and thin severely this shelter, allowing the winter gales to seeth through, thus destroying this natural protection which was one of the main attractions for birdlife there on the beach, as has been observed by the writer for thirty years.

The soil throughout the park is sand and gravel. There is no shifting of sand on Long Beach as is prevalent on a typical sand dune. There is a slight accumulation of surface humus in the more wooded areas. The deposit of trash is heavy within the limits of flood tides.

No fresh-water ponds or springs occur on the beach, except three small artificial holes dug years ago when the beach was used for a cattle run. Therefore, fresh-water swamp flora is practically unknown on the beach.

On the ridges are found post oak, *Quercus stellata*, black oak, *Quercus velutina*, pitch pine, *Pinus rigida* and the other species mentioned above. In the gravelly salt marshes between the ridges are a heavy growth of marsh elder, *Iva frutescens*, groundsel-bush, *Baccharis halimifolia* and the salt marsh grasses and sedges, *Distichlis spicata*, *Spartina Michauxiana*, *Spartina patens*, *Spartina stricta*, and black-grass, *Juncus Gerardi*. The Narrows is vegetated by a covering of low-growth species which have been mentioned above.

The beach is rich in dry-soil mosses and lichens, especially the Cladoniae. *Cladonia alpestris* is found there, one of the two known stations on Long Island for this northern species. The bark lichens are also well represented there, as are the marine algae and certain groups of fungi.

Among the higher plants found on the park the following are noteworthy as species of rare occurrence or unknown elsewhere on eastern Long Island. These are:

Selaginella rupestris. Rare in two small colonies; growing on pure beach sand among red cedars. The only locality for this species known to the writer for Long Island.

Fimbristylis castanea. One small colony in salt marsh. The only station in the township of Southold.

Vagnera stellata. Very common over most of the ridges.

Polygonum tenue. Rare. Gravelly knolls in salt marshes. Only one other station in the Southold Flora.

Chenopodium leptophyllum. Rare.

Aquilegia canadensis. Two localities. The only Orient stations.

Arabis glabra. Common. Unknown to the writer elsewhere on the North Fork of Long Island.

Draba caroliniana. Rare. Known from only one other station on eastern Long Island.

Robertiella Robertiana. Rare; growing in beach sand. Known from one other station on eastern Long Island.

Ligusticum scothicum. Very common This handsome Ammiaceae, a characteristic plant of Orient, if found in three localities on Long Island, and Orient is the only station in the state where it is abundant. It is a growth of brackish borders of woods and higher edges of salt meadows. It is found throughout the park in suitable situations.

Among the introduced species of interest found on the park are: *Allionia linearis*, *Cerastium semidecandrum*, *Holosteum umbellatum*, *Glaucium Glaucium*, *Rosa rugosa*, *Onopordon Acanthium.*

All ferns are rare on the beach, although *Pteridium aquilina* is general in higher places. *Polypodium vulgare* and *Polysticum acrostichoides* are local and rare.

The following families represent the native flora of the new State Park except where otherwise noted. The nomenclature follows the order of the Illustrated Flora by Britton and Brown. Second Edition.

Polypodiaceae

Polystichum acrostichoides (Michx.) Schott. Very rare.
Pteridium aquilinum (L.) Kuhn. Not common.
Polypodium vulgare L. Very rare.

Selaginellaceae.

Selaginella rupestris (L.) Spring. As noted above.

Pinaceae.

Pinus rigida Mill. Common.
Juniperus virginiana. L. Very common. Typical growth rare.

Zannichelliaceae.

Ruppia maritima L. Common. Salt-water ponds.

Zosteraceae.

Zostera marina L. Formerly abundant. Now unknown as a living species.

Scheuchzeriacaea.

Triglochin maritima L. Rare. Salt meadows.

Gramineae.

Schizachyrium scoparium (Michx.) Nash. Common.
Schizachyrium littorale (Nash) Bickn.
Paspalum Muhlenbergii Nash. Rare.
Paspalum pubescens Muhl. Rare.
Panicum capillare L. Common.
Panicum virgatum L. Very Common.
Panicum depauperatum Muhl. Rare.
Panicum sphaerocarpon Ell. Not common.
Panicum dichotomum L. Common.
Panicum huachucae Ashe. Common.
Panicum Commonsianum Ashe. Rare.
Panicum Scribnerianum Nash. Rare.
Chaetochloa umberis (Poir.) Scribn. Common. Salt marshes.
Cenchrus tribuloides L. Rare.
Savastana odorata (L.) Scribn. Rare. Salt meadows.
Muhlenbergia Schreberi Gmel. Rare.
Sporobolus asper (Michx.) Kunth. Rare.
Agrostis maritima Lam. Common. Salt meadows.
Agrostis hyemalis (Walt.) B. S. P. Common. Dry ridges.
Ammophila arenaria (L.) Link. Common.
Danthonia spicata (L.) Beauv. Common.
Spartina Michuxiana Hitchc. Common.
Spartina patens (Ait.) Muhl. Very common.
Spartina stricta (Ait.) Roth. Very common.
Triplasis purpurea (Walt.) Chapm. Rare.
Eragrostis pectinacea (Michx.) Steud. Rare.
Distichlis spicata (L.) Greene. Very common.
Festuca octoflora Walt. Rare.
Festuca ruba L. Rare.
Elymus halophilus Bickn. Common. Salt marshes.

Cyperaceae.

Cyperus filicinus Vahl. Very common.
Cyperus strigosus L. Common.

Cyperus filiculmis Vahl. Common.
Cyperus Grayi Torr. Rare.
Stenophyllus capillaris (L.) Britton.
Fimbristylis castanea (Michx.) Vahl. See note above.
Scirpus nanus Spreng. Rare. Salt marshes.
Scirpus americanus Pers. Common.
Scirpus robustus Pursh. Rare.
Carex hormathodes Fernald. Rare.
Carex silicea Olney. Common.
Carex pennsylvanica Lam. Common.
Carex Swanii (Fern.) Macke.

Juncaeae.

Juncus Gerardi Lois. Very common.
Juncus tenuis Willd. Rare.
Juncus Greenei Oakes. & Tuck. Rare
Juncoides campestre (L.) Kuntze.

Liliaceae.

Asparagus officinalis L. Introduced. Rare.
Vagnera racemosa (L.) Morong. Rare.
Vagnera stellata (L.) Morong. Very common. See note above.
Unifolium canadense (Desf.) Greene. Local.
Uvularia sessilifolia L. Rare.
Polygonatum commutatum L. Rare.

Smilaceae.

Smilax herbacea L. Rare.
Smilax rotundifolia L. Rare.

Orchidaceae.

None recorded from the area.

Juglandaceae.

Hicoria glabra (Mill.) Britton. Very rare.

Myricaceae.

Myrica carolinensis (Mill.) Very common.

Fagaceae.

Quercus velutina Lam. Local.
Quercus stellata Wang. Very common.

Ulmaceae.

Celtis occidentalis L. Not common.

Polygonaceae.

Polygonum exsertum Small. Rare.

Polygonum buxiforme Small. Common.
Polygonum tenue Mx. Rare. See note above.
Polygonum prolificum (Small.) Robi. Common. Salt marshes.
Polygonum atlanticum (Robi.) Bick. Rare. Shores.
Persicaria pennsylvanica (L.) Small. Rare.
Tinaria scandens (L.) Small. Rare.
Polygonella articulata (L.) Meisn.

Chenopodiaceae.

Chenopodum leptophyllum (Moq.) Nutt. Rare. See note above.
Chenopodum hybridum. Local.
Atriplex hastata L. Common.
Salicornia europaea L. Common.
Salicornia Bigelovii Torr. Rare.
Salicornia ambigua Michx. Very common.
Dondia linearis (Ell.) Heller. Common.
Dondia maritima (L.) Druce. Common.
Salsola Kali L. Common.

Phytolaccaceae.

Phytolacca americana L. Very rare.

Nyctaginaceae.

Allionia linearis Prush. Adventive. Rare. See note above.

Alsinaceae.

Cerastium semidecandrum L. Introduced. Rare. See note above.
Holosteum umbellatum L. Introduced. Rare. See note above.
Arenaria serpyllifolia L. Introduced. Very common.
Moehringia lateriflora (L.) Fenzl. Common.
Honkenya peploides (L.) Ehrh. Common.
Tissa marina (L.) Britt. Very common.

Caryophyllaceae.

Silene caroliniana Walt. Common.
Silene antirrhina L. Not common.

Ranunculaceae.

Aquilegia canadensis L. Two stations. See note above.
Thalictrum revolutum DC. Very rare.

Lauraceae.

Sassafras Sassafras (L.) Karst. Not common.

Papaveraceae.

Glaucium Glaucium (L.) Karst. Introduced. Locally common.

Cruciferae.

Draba caroliniana Walt. Rare. See note above.
Draba verna L. Introduced. Very common.
Arabis glabra (L.) Bernh. Common. See note above.
Cardamine parviflora L. Rare.
Cakile edentula (Bigel.) Hook. Common.

Rosaceae.

Potentilla canadensis L. Common.
Argentina Anserina (L.) Rydb. Very rare.
Fragaria virginiana Duche. Rare.
Agrimonia gryposepala Wallr. Very rare.
Geum canadense Jacq. Very rare.
Rubus procumbens Muhl. Rare.
Rosa virginiana Mill. Very common.
Rosa rugosa Thunb. Introduced. Rare.

Malaceae.

Malus Malus (L.) Britt. Introduced. Rare.
Amelanchier canadensis (L.) Medic. Very common.
Crataegus Crus-galli L. Very rare.

Amygdalaceae.

Prunus maritima Wang. Very common. See notes above.
Padus virginiana (L.) Mill. Rare.

Caesalpiniaceae.

Chamaeriata fasciculata (Michx.) Greene. Common.

Fabaceae.

Lespedeza capitata Michx. Very rare.
Lathyrus maritimus (L.) Bigel. Very common.
Strophostyles helvola (L.) Britt. Common.

Geraniaceae.

Robertiella Robertiana (L.) Hanks. Rare and local. See note above.
Geranium maculatum L. Very rare.

Oxalidaceae.

Xanthoxalis stricta (L.) Small. Common.

Polygalaceae.

Polygala verticillata L. Not common.
Polygala ambigua Nutt. Rare.

Euphorbiaceae.

Acalypha gracilens A. Gray. Rare.
Chamaesyce polygonifolia (L.) Small. Common.

Anacardiaceae.

Rhus copallina L. Common.
Rhus glabra L. Rare.
Toxicodendron radicans (L.) Kuntze. Very common.

Ilicaceae.

Ilex verticillata (L.) A. Gray. Rare.

Celastraceae.

Celastrus scandens. Very rare.

Vitaceae.

Parthenocissus quinquefolia (L.) Planch. Common.

Tiliaceae.

Tilia americana L. Very rare.

Hypericaceae.

Hypericum mutilum L. Rare.
Hypericum canadense L. Rare.
Sarothra gentianoides L. Very common.

Cistaceae.

Hudsonia tomentosa Nutt. Very common.
Lechea maritima Leg. Very common.

Violaceae.

Viola fimbriatula J. B. Smith. Very rare.

Cactaceae.

Opuntia Opuntia (L.) Cult. Common.

Onagraceae.

Oenothera biennis L. Common.
Oenothera Oakesiana Robbins. Common.
Kneiffia fruticosa (L.) Raima. Common.
Circaea lutetiana L. Very rare.

Araliaceae.

Aralia nudicaulis L. Rare.

Ammiaceae.

Sanicula marylandica L. Very rare.
Heracleum lanatum Michx. Very rare.
Ligusticum scoticum L. Very common. See note above.

Pyrolaceae.

Chimaphila maculata (L.) Pursh. Very rare.
Chimaphila umbellata (L.) Nutt. Very rare.

Monotropaceae.

Monotropa uniflora L. Very rare.
Hypopitys lanuginosa (Michx.) Nutt. Very rare.

Ericaceae.

Uva-Ursi Uva-Ursi (L.) Britt. Very common.

Vacciniaeceae.

Gaylussacia baccata (Wang.) K. Koch. Very rare.
Vaccinium vacillans Kalm. Very rare.

Primulaceae.

Samolus floribundus H. B. K. Very rare.
Lysimachia quadrifolia L. Rare.
Trientalis americana Pursh. Rare.

Plumbaginaceae.

Limonium carolinianum (Walt.) Britt. Very common.

Gentianaceae.

Sabbatia stellaris Pursh. Very common.

Asclepiadaceae.

Asclepias syriaca L. Very rare.
Asclepias verticillata. Very rare.

Convolvulaceae.

Convovulus sepium L. Very common.

Boraginaceae.

Onosmodium virginianum (L.) DC. Very rare.

Verbenaceae.

Verbena urticifolia L. Rare.

Labiatae.

Teucrium littorale Bickn. Very common.
Trichostema dichotomum L. Rare.
Lycopus virginicus L. Very rare.

Solanaceae.

Solanum nigrum L. Rare. Probably introduced.
Solanum Dulcamara L. Introduced. Rare.

Scrophulariaceae.

Linaria canadensis (L.) Dumort. Very common.
Scrophularia leporella Bick. Very rare.
Dasystoma virginica (L.) Britt. Rare.
Agalinis purpurea (L.) Britt. Rare.
Agalinis maritima Raf. Rare and local in salt marches.
Pedicularis canadensis L. Very rare.
Melampyrum lineare Lam. Rare.

Plantaginaceae.

Plantago halophila Bickn. Common.
Plantago maritima L. Very common.

Caprifoliaceae.

Sambucus canadensis L. Common.
Triosteum perfoliatum L. Very rare.

Campanulaceae.

Specularia perfoliata (L.) A. DC. Rare.

Lobeliaceae.

Lobelia inflata L. Rare.

Cichoriaeae.

Krigia virginica (L.) Willd. Rare.
Lactuca canadensis L. Rare
Hieracium Gronovii L. Rare.
Hieracium venosum L. Rare.
Nabulus trifoliatus Cass.

Ambrosiaceae.

Iva frutescens L. Very common. See note above.
Ambrosia elatior L. Common.
Xanthium commune Britt. Common.

Compositae.

Lacinaria scariosa (L.) Hill. Very rare.
Chrysopsis falcata (Pursh.) Ell. Not common.
Solidago caesia L. Very rare.
Solidago bicolor L. Very common.
Solidago sempervirens L. Very common.
Solidago odora Ait. Rare.
Solidago rugosa Mill. Rare.
Solidago altissima L. Very rare.
Solidago juncea Ait. Very rare.
Solidago nemoralis Ait. Very rare.
Euthamia graminifolia (L.) Nutt. Very rare.
Sericocarpus asteroides (L.) B.S.P. Very rare.

Aster undulatus L. Rare.
Aster patens Ait. Rare.
Aster novi-belgii L. Rare.
Aster multiflorus Ait. Common.
Aster dumosus L. Rare.
Aster tenuifolius L. Common.
Aster subulatus Michx. Not common.
Erigeron pulchellus Michx. Rare.
Erigeron ramosus (Walt.) B.S.P. Common.
Leptilon canadense (L.) Britt. Common.
Doellingeria umbellata (Mill.) Nees. Very rare.
Ionactis linariifolius (L.) Greene. Not common.
Baccharis halimifolia L. Very common. See note above.
Pluchea camphorata (L.) DC. Common.
Antennaria plantaginifolia (L.) Rich. Rare.
Gnaphalium obtusifolium L. Very common.
Gnaphalium uliginosum L. Rare.
Helianthus giganteus L. Very rare.
Helianthus divaricatus L. Very rare.
Bidens discoidea (T. & G.) Britt. Rare.
Achillea Millefolium L. Common.
Artemisia caudata Michx. Very common.
Artemisia Stelleriana Bess. Common.
Erechtites hieracifolia (L.) Raf. Common.
Cirsium horridulum Michx. Rare.
Onopordon Acanthium L. Introduced. Rare.

Orient, Long Island, N.Y.

FIELD TRIPS OF THE CLUB

Trip of August 19.

About thirty Torrey members and friends gathered at Point Pleasant for the trip on August 19. A drive of about two miles took us to a cove on the north side of the Manasquan River where we found a fine stand of *Hydrocotyle Canbyi* and two specimens of *Eryngium aquaticum*. These were the remains of a dwindling stand that seems doomed from natural causes as it is undisturbed by man or beast. A few miles farther up the river, near Allaire, there was formerly a fine lot of *Habenaria ciliaris*. We could find only two specimens as where they had grown in the sod for many years there was now a prosaic field of *Brassica oleracea*.

Next we visited the home of the leader overlooking the Manasquan, for *Hibiscus Moscheutos* and *Pluchea camphorata*. Here also were shown specimens of *Habenaria nivea*, *Eryngium virginianum*, and *Sclerolepis uniflora* collected a few days earlier near Cape May.

After a picnic lunch we drove south to Seaside Heights, across Barnegat Bay, to Toms River, and down the Jolly Tar trail to a very interesting spot near Waretown. Here *Coreopsis rosea*, *Polygala lutea*, and P. *cruciata* were abundant. We journeyed on through Barnegat and Warren Grove to the edge of the Plains for the find of the day, *Habenaria integra*. Even the Botany Department of Rutgers is at last convinced that *integra* still grows in New Jersey. There were quantities of Xyris, Eriocaulon, and all three of the Droseras. Corema, Hudsonia, and Dendrium were abundant. A few specimens of *Habenaria blephariglottis* were seen. This also seems to be disappearing as localities having hundreds a few years ago have few or none this year. A hurried call to the region south of Chatsworth for Schizaea and the fruiting plants of Abama and Tofielda and to New Lisbon for Lygodium finished the trip.

Vernon L. Frazee

TRIP OF OCTOBER 7. BEARFORT MOUNTAIN, SURPRISE LAKE AND THE UNKNOWN POND, PASSAIC CO., N. J.

The group of ten members making the trek up and over the Schunemunk conglomerate to Lookout Rock found the scene there, and beyond, so glorious that mere botanizing was forgotten temporarily. When, after a series of rainy week-ends, we were greeted by the first good Sunday of the fall season great was the rejoicing. No early frost had reached the heights and at the foot of the trail were noted numerous asters in full bloom, among them:—*A. ericoides*, *A. cordifolius*, *A. undulatus*, and a hybrid or two, and up the trail *A. acuminatus*.

Potentilla monspeliensis was conspicuous among other late blooming summer species, as we started the ascent.

Over the rocky ridges were noted those plants that are typical of the region:—viz.—*Aronia melanocarpa* thriving in the interstices of the rocks, bearing much fruit. *Prunus pennsylvanica*, *Quercus ilicifolia*, *Betula populifolia*, and a surprising spread of *Aralia hispida*. Several lingering specimens of *Corydalis sempervirens* were found to be in bloom, as well as *Vaccinium pennsylvanicum*.

So clear was the day that the Catskill peaks were visible far northward, and the tower at High Point Park was plainly discernible. A stiff breeze greeted us on the summit, so we lunched at Surprise Lake.

Here, far from the haunts of man, and where silence reigned supreme, we invited our souls. Patches of *Woodwardia virginica* and *Chamaedaphne calyculata* bordered the shore toward the outlet. Resplendent Nyssas enhanced the beauty of the spot. In the bog were hastily noticed, *Drosera rotundifolia* and *Sarracenia purpurea*.

A conference was held as to which course to pursue; to explore hereabouts or push on for the Unknown Pond. The latter choice proved unanimous. In consequence some good foot work was accomplished, even to getting off the trail at intervals, and the objective was reached just in time to consider the return in order to emerge from the woods before dusk and in time to catch the only train home! Certain members would have preferred lingering, even at the risk of being marooned!

Azalea viscosa, *Nemopanthus mucronata* and *Picea rubra* were noted.

A ruffed grouse was flushed while ascending the trail, tree swallows were swirling in the strong wind atop the ridges, a spring peeper announced himself from a nearby bog, a walking stick was captured and a spider enthusiast collected several individuals of the beautiful common *Aranea marmorea.*

The descent was made to the accompaniment of the swan song of a few katydids, and all voted the day's outing too brief, with a promise to return for further exploration when daylight saving would reappear.

HELENE LUNT

PROCEEDINGS OF THE CLUB

Meeting of October 2, 1934

The meeting of the Torrey Botanical Club was called to order at the American Museum of Natural History at 8:30 P.M. by President Hazen. There were twenty-six members present.

The following were unanimously elected to membership in the club: Mrs. W. D. Diddell, 333 East 7th Street, Jacksonville, Florida; Mrs. F. G. Dunham, 450 Beverly Road, Ridgewood, N. J.; Mr. L. S. Jaffe, Columbia University, New York; Mr. Quinby M. Kipp, 138 No. Columbus Avenue, Mount Vernon, N. Y.; Mrs. M. B. Rowoan, Ridgewood, N. J.; Mrs. L. C. Warren, 531 West 122 Street, New York, N. Y.

The resignation of Mr. Ernest L. Spencer was accepted with regret.

We have lost Dr. Frank N. Johnson through death.

President Hazen called for comments from members on their field experiences.

Dr. Harper reported his success in growing Butomus from seed, flowering it about July 1.

Mr. Raymond Torrey suggested that the Azolla found growing in Kettleholes in Long Island which are being destroyed in park improvements might be planted and maintained in ponds in botanical gardens and elsewhere. He also told about his trip into the Southern Appalachians, about a quaking cranberry bog which he visited in the Monongahela National Forest.

Dr. S. M. Pady told about his trip to Lake Tomogomie in Northern Ontario and the very fine stand of virgin red pine in that region.

Dr. Harper further reported on the foray during the summer with Dr. Dodge, Dr. Whetzel and other mycologists hunting fungi.

Dr. R. P. Wodehouse told about his stay at Woods Hole and his search for flowering plants of the marine eel grass and Zostera. A few apparently vigorous colonies of eel grass near Woods Hole failed to yield any flowers, but Mr. Wren, an assistant there, guided him to flowering eel grass. He found that plants dropped their leaves when they flowered and the sickly

looking ragged patches of eel grass were full of blossoms which shed their pollen immediately they were touched, the pollen mass being long, slender and sticky. He also spoke about collecting samples of peat from twenty-four different ponds in the Elizabeth Islands off Cape Cod.

Mrs. G. P. Anderson reported finding a rare form of Cetraria at Lake Mohawk near Delaware Water Gap, also a very rich find of lichens on the eastern shore of Maryland. She also remarked upon Scarlet Salvia as grown in a nursery in Northern New Jersey with flowers varying from purple to pink and white in coloring and suggested that an inheritance study of these would yield some interesting material.

Mr. Raymond H. Torrey spoke in favor of more collections of lichens for study of their local distribution and the need of a popular hand book for field students.

Dr. S. Trelease suggested that he would have use in his experimental work for a fast growing lichen. For this purpose Mrs. Anderson recalls *Cladonia turgida* which grows one quarter of an inch a year.

Dr. E. W. Sinnott exhibited a surprising collection of small gourds and pumpkins varying in color and form from yellow to green and gold. He said that all of these gourds and pumpkins are all one species and will readily intercross.

Meeting adjourned at 9.55 P.M.

FORMAN T. MCLEAN, *Secretary*

MEETING OF OCTOBER 17, 1934

The Meeting was called to order at The New York Botanical Garden at 3:30 P.M. by President Hazen. There were twenty members present.

The minutes of the meeting of October 2nd were read and approved.

Mr. J. Harry Logan, 95 Sagamore Road, Bronxville, N. Y., was unanimously elected to membership in the club.

Mr. Otto Degener gave an interesting talk on "Collecting Experiences in Hawaii."

In 1929, as Naturalist of the Hawaiian National Park, Mr. Degener wrote the "Plants of Hawaii National Park, with Descriptions of Ancient Hawaiian Customs and an Introduction to the Geologic History of the Islands."

During the years from 1927 to 1932 collections of plants were made on Oahu, Kauai, Maui, Molokai and Hawaii. Much of the time he had with him as assistants young Hawaiians, one of Japanese extraction doing much of the illustrating of the "Flora Hawaiiensis." The first volume of the Flora was published in 1933.

After a stay of almost a decade in the Hawaiian Islands Mr. Degener has been able to amass an unexcelled collection of Hawaiian plants estimated to contain upward of 40,000 specimens. He has written three profusely illustrated books on the Hawaiian flora, one of which is of a popular nature. He has amassed hundreds of illustrations of local plants drawn by students under his personal direction. More than half of these plates yet remain to be published in succeeding books of the Flora. He has collaborated by the loan of specimens to the B. P. Bishop Museum and the Field Museum in monographic studies of the Mosses, *Astelias*, *Peperomias*, *Labiatae* and *Compositae*. He has distributed by gift, sale or exchange duplicate specimens of Hawaiian plants to leading botanical institutions in America and Europe. These shipments comprise chiefly endemic plants, though pan-tropic ones are not lacking.

The lecture was illustrated with lantern slides.

Meeting adjourned at 4:45 P.M.

FORMAN T. MCLEAN, Secretary

NEWS NOTES

Dr. S. L. Stevens, professor of plant pathology at the University of Illinois for twenty years died on the sixteenth of August at the age of sixty-three. Dr. Stevens was the author of several textbooks for elementary schools as well as the author of numerous papers on fungi. Among his well-known textbooks are *Agriculture for Beginners*, *Diseases of Economic Plants*, and *Fungi which cause Plant Diseases*.

MR. KENNETH K. MACKENZIE, a member of the Torrey Botanical Club for many years, died on October 22. Mr. Mackenzie, an attorney in New York City, was an authority of the sedges. Two years ago he presented the New York Botanical Garden his herbarium of some 43,000 specimens. In his will he

bequeathed to the garden his remaining specimens and a collection of nearly 1,000 drawings. He also left a fund of ten thousand dollars to be used in the publication of these drawings.

H. L. WESTOVER AND C. R. ENLOW have returned to Washington after seven months spent in Russian Turkestan and the Turkish Republic collecting plants suitable for soil binders in arid regions. They brought back 1,800 lots of seeds of plants as well as root cuttings of plants that give promise of value. Most of these are of grasses that grow in a region where there is no water except in winter. "Last summer's drought with its frequent dust storms emphasized the great need of soil-holding plants. We are hopeful that something of real value for our great plains and the Southwest will be found in the collection," said F. D. Richey, chief of the bureau of plant industry. The explorers travelled by camel, horseback and automobile in the course of their explorations, and received valuable help from officials and plant experts of both the Soviet and Turkish governments.

DATES OF PUBLICATION OF TORREYA, VOLUME 34

January–February	March 3
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July–August	August 24
September–October	November 9
November–December	January 8

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The names of species and varieties described as new are in **black faced type.**

THE TORREY BOTANICAL CLUB

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Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
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TORREYA

A Bi-Monthly Journal of Botanical Notes and News

John Torrey 1796–1873

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

GEORGE T. HASTINGS

VOLUME 35

New York

1935

Volume 35 January–February, 1935 No. 1

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THE TORREY BOTANICAL CLUB

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TORREYA

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Natural interest in Nature

DARWIN S. LEVINE

We often express concern over the fact that our children are being bred on cobblestones and asphalt pavements and are losing or have lost the "feel" of the "dirt" and grass. In fact many fear that the children, and consequently the adults who have grown up from such childhood backgrounds, can no longer enjoy that interest in nature so pronounced among the members of the past generations and so vital for the realization of the "full life." Considering this fear, an experience enjoyed by the writer this summer may prove as refreshing to the readers as it did to him.

The summer was spent in a colony on the shores of one of the most beautiful lakes in the Catskills. Since the season of 1926 the children and the older folks who have been permanent summer residents there, have walked the forest paths, climbed over the rocks, trodden relentlessly on whatever plants happened to grow in their paths, gathered and frequently killed salamanders, toads, snakes and other animals, caught snapping turtles and handled them in ways only the uninitiated would do, and in general lived a life of total disregard for the values, beauties and even dangers of the region. The only flowers they knew were the daisy and the buttercup. The only trees they knew were the pine trees—every conifer was, of course, a pine—and the trees with "leaves." Salamanders were lizards. Copperhead snakes were reputed to be in the neighborhood, but so many years had elapsed since one was seen or killed, that they were relegated to the limbo of legend and folk lore. The habits attributed to snapping turtles were merely stories to frighten or charm children, but not to be taken seriously by an adult. In fact all turtles were alike and the designation of "snapping turtle," which was the only specific name ever used, was largely

for anecdotal purposes or to designate the large turtles from the small. Such was the extent of their nature knowledge.

Having some time to devote to an interesting experiment, the writer suggested to several members of the community that daily nature walks be organized where a bit of the rich natural history of the section would be explained to all interested. No motive other than that of learning the environment was offered as an incentive. The proposal was accepted with alacrity by almost everyone in the colony, young and old. So each fair morning at eleven o'clock the group gathered for the daily jaunt. There were little tots of five, children from eight to sixteen, and mothers of families. In some cases the women arose an hour earlier than usual each day, in order that they might cook their mid-day meal in time to join the "hikers." All were enthusiastic and vied with each other for the honor of the greatest accumulation of natural history information.

Our trips were short and varied. Some days we hardly advanced more than a few feet, for the story of a chestnut tree or the tale of the deadly "Destroying Angel"—a toadstool—or the recounting of the beautiful legend concerning the Indian Pipe or Corpse Plant, made the hour and a half pass so quickly that we had to return home before we had advanced at all. Other days we spent in searching in a shale bed for other rock forms, perchance a fossil, or a stray bit of quartz left there by the glacier. One session was spent on a trip in row boats to a lake which adjoined ours, where we hoped to find forms of fresh water and bog life. Our booty when the excursion was over that day and notes were compared, consisted of a tiny painted turtle, a number of kinds of water insects, a water snake, a small sun fish captured in a net with the help of cracker dust, and about forty kinds of bog plants including a beautiful clump of pitcher plant with its long-peduncled, lemon-colored blossom. When a visitor came to the colony, he would be escorted over some of the ground already covered by one of the group, who explained enthusiastically objects of which all had been ignorant only a few weeks before.

Before long the region began to take on a new meaning to our colonists. No longer did they pull armfuls of club moss for an evening's decoration, or cut mountain laurel bushes to adorn a bare corner of a porch. They circumspectly stepped on the

greensward and avoided treading on the Wake Robin when ambling through the woods. A clump of poison ivy, for two seasons nurtured by one of the settlers near a beautiful young white pine at the corner of his house, was properly dug up and disposed of. Shelving rock shelters were approached with diffidence lest a lurking rattler should be disturbed. The gray birch was no longer girdled in an effort to slice large slabs of bark for various uses. One lady, who gathered mushrooms frequently, became aware for the first time of the vast number of imposters parading under the guise of an innocent "mushroom." One youngster, eleven years of age, who had been coming to the colony since he was three, told his father one week-end, "For the first time my eyes are open to the wonders of this place. To think how blind I have been all these years!"

From these daily trips there developed two outgrowths. Several members suggested the value of permanent labels along the trails we had been following. The natural result was a Nature Trail. Different individuals undertook the duty of learning and concisely describing on small placards the specific objects of interest along the way. These brief legends were then printed with black India ink on white enameled boards, and, after being shellaced to assure the weather-proofing, were placed on or near the items described. This might have been a tree, a flower, a rock, a puff-ball or any other thing along the way.

Then one member suggested that it would be worth while to gather different types of mosses and place them side by side in a permanent collection so that all could see the differences and learn to distinguish them more readily in the field. Out of this thought grew a museum. The corporation that built the colony turned over for our use a small building about ten feet by ten, formerly used as an office. Here we collected about twenty kinds of mosses, appropriately labelled, and arranged in conditions as closely approximating their natural habitats as possible, such as on rocks, rotten stumps, fertile soil, and in water. Different kinds of ferns were pressed, mounted and hung on the walls side by side. The same was done to flowers, tree leaves, those fungi that could last without rotting, rocks, and as many different natural objects as time and space permitted. One of the members brought a large aquarium which was stocked with plants and animals found in the lake. A few

cages were constructed in which frogs, toads, salamanders and snakes were exhibited. Toward the end of the season collections were made by the children of the colony, of leaf prints of various trees, flowers and grasses on blue print paper manufactured by the children themselves. Plaster casts of leaves were also made and colored with water color paint. Thus from a desire to study the fauna, flora and physiography of the region there evolved a manipulative desire as a result of which most of the group not only learned their local natural history but made and took home with them items of interest based upon their nature study.

The writer no longer will fear the loss of an inherent interest in nature study on the part of city children and city-bred adults. Let us try in every way within our power to bring nature to our city youth, artificial as those situations and presentations may be, and we may feel secure in the knowledge that when those young people, by some happy combinations of circumstances, find themselves in the woods, fields and meadows, they will respond to the call of Mother Nature with that zest so characteristic of those whose ingrained desires have been consistently repressed.

Theodore Roosevelt High School
New York City

Notes on some New Jersey plants

J. L. Edwards and R. T. Clausen

Dwarf Yellow-eyed Grass, *Xyris montana* Ries. The writers visited Pine Swamp, west of Mashipacong Lake, Sussex County, on Sept. 5, 1932, in quest of the Dwarf Mistletoe (*Arceuthobium pusillum*), which Mackenzie and Griscom[1] had first found there in June, 1920. We were successful in finding this on a number of the Black Spruce trees in the bog at the southern end of the swamp. We also found a number of the other interesting species recorded from the region, including *Carex subulata*, *Carex rostrata*, and the Pale Laurel, *Kalmia polifolia*. In the open sphagnum area were a number of plants of *Xyris montana* in flower. One of these collected is 10.7 cm. high, the leaves are very narrow and about 2.5 cm. long, the head is 4 mm. in diameter, the scales 5, and the lateral sepals erose near the apex. This station for *Xyris montana* was discovered on July 10, 1920 by Griscom,[1] who found some plants of the species in a bog at the north end of the swamp.

Wax Myrtle, *Myrica cerifera* L. A single specimen was noted on Sept. 17, 1932, in swampy pine barrens north of May's Landing, Atlantic County. This is apparently of rather rare occurrence north of Cape May County.

Milkwort, *Polygala mariana* Mill. In September, 1932, this species was found to be fairly common on dry open ground at the edge of the marshes at Barnegat, Ocean County.

Galium labradoricum Wiegand. There is a sheet of the Labrador Bedstraw in the local collection at the New York Botanical Garden, collected by Mr. K. K. Mackenzie in an open hillside swamp above Vernon, Sussex County. So far as we know, this represents the only record of this bedstraw in New Jersey. Additional records, therefore, may be of interest. On June 18, 1932, the writers found a considerable number of plants of this species in a boggy area in the Springdale Swamp in Sussex County. In 1933 this station was again visited and further collections were made. The plant was also found in 1933 in the swamp at the north end of Glover's Pond.

[1] Griscom, L. Rhodora. 33: 101. 1931.

Blazing Star, *Liatris scariosa* Willd. Thanks are due to Mr. C. A. Urner of Elizabeth for telling us of the occurrence of this species on the Great Island area of the Newark Meadows in Union County. A trip was made there on Sept. 24, 1932. A number of plants were seen in flower and one specimen was collected. This plant is known to the writers from only two other stations in New Jersey. One is in Monmouth Co. between Matawan and Keyport, and the other is in Middlesex Co. south of Spotswood, where it was first found by Waldron DeWitt Miller in 1924.

Specimens were made of all of the above, and in the case of the Myrica, Galium, and Liatris, have been deposited in the herbarium of Cornell University. Specimens from all three stations for *Liatris scariosa* have been deposited in the herbarium of Rutgers University.

Cornell University
Ithaca, New York

Some recent observations on and additions to the flora of Western New York

Irving William Knobloch

Since the publication of Mr. Charles Zenkert's "Flora of the Niagara Frontier Region," a Buffalo Society of Natural Science Bulletin, the exact status of the local flora has been much clarified. Local enthusiasts can now proceed with certainty when calling attention to new adventives or otherwise rare species in our midst.

Using this fine volume as a guide, supplemented by the "Flora of the Allegany State Park Region" by Homer D. House and William P. Alexander, which covers that region of Cattaraugus County, south of Salamanca, N. Y., a fairly complete list of Western New York plants is available.

After a perusal of the two above-mentioned volumes, I submit the following records which should be interesting to students of local conditions.

Erie County:—

Equisetum scirpoides Michx., the Sedge-like Horsetail, has not been located in this county heretofore. It was located on May 13, 1934 by Mr. Gerhard Blodorn at Lawton's Corners, N. Y.

Thuya occidentalis L., the Arbor Vitae, is not mentioned in Mr. Zenkert's flora as occurring in Erie County. It was quite a surprise to note a good-sized cedar swamp about fifteen miles from Buffalo, near the town of Alden. It is an altogether beautiful and interesting locality since *Benzoin aestivale*, *Drosera rotundifolia*, *Rhamnus alnifolia*, *Cystopteris bulbifera*, *Aralia racemosa*, *Spiranthes cernua* and *Conioselinum chinense* are all more or less closely associated with the restful green of the arbor vitae.

Allegany State Park:—

In this huge sixty-five thousand acre tract, one of two unglaciated areas in New York state, many plants are missing which are found a few miles north, in glaciated soil. However, there is quite an interesting flora despite the lack of boreal elements.

Campanula rapunculoides L., the Creeping Bellwort, was recently located at the old Smith chemical works, in the park. Of course, it is an adventive, originally coming from Eurasia.

Claytonia virginica L., *Cardamine Douglassii* (Torr.) Britton., *Carex pedunculata* Muhl., and *Erigeron pulchellus* Michx., are four species which seem to have been overlooked in the compilation of the park flora list. This fact is readily explainable because few if any botanically-minded persons have visited the park during the very early spring.

Antennaria plantaginifolia (L.) Richards. was located during June 1934 in two places in the park.

Equisetum limosum L., the Swamp Horsetail, may now be considered as a shore-line floral component of the artificial Red House Lake.

Arisaema Dracontium (L.) Schott., the Green Dragon, is interesting because, as far as the records go, it was not relocated, until recently, along the Allegany River since David F. Day found it in 1882. At the present time, we know it from a number of stations from Salamanca southward.

Acer saccharum Marsh. var. *nigrum* (Michx. f.) Britton., is represented by three or four known specimens in the park. Whereas the bark, lenticels, and the shape of the leaves are characteristic of the Black Maple, the pubescence on the leaves is not as dense as ordinarily encountered.

One of the big features of a game management plan, recently inaugurated in Allegany State Park, is the planting of game food plants in various parts of the area. In this connection, a number of species have been put out which are not native to this park and it is thought highly desirable to mention these to avoid confusion arising in anyone's mind when finding these strangers way back in some valley slashing or meadow.

These plants are: *Juglans nigra* L., *Aronia arbutifolia* (L.) *Ell.*, *Cornus stolonifera* Michx., the variety *incisifolia* of *Sambucus canadensis* L., *Betula alba* L. var. *papyrifera* (Marsh.) Spach., and *Cephalanthus occidentalis* L.

Some herbaceous plants introduced on the nature trail, near the Administration Building and around the margins of Red House Lake are; *Valeriana uliginosa* (T. & G.) Rydb., *Brasenia Shreberi* Gmel., *Mitella nuda* L.; *Parnassia caroliniana* Michx., *Viola renifolia* Gray., *Nymphaea advena* Ait., *Peltandra vir-*

ginica (L.) Kunth., *Zizania aquatica* L., *Cyperus esculentus* L., *Pontederia cordata* L., *Potamogeton natans* L., *Phragmites communis* Trin., *Vallisneria spiralis* L., *Nelumbo lutea* (Willd.) Pers., and *Frasera caroliniensis* Walt.

Nyssa sylvatica Marsh., the Black or Sour Gum, is an infrequent component of the park flora. Recently a specimen was located on one of the ridges, so large that it is worth while to record its measurements. This tree is seventy-one and a half feet tall. I estimate that twenty feet of top is missing, having broken off at some time in the past, which would bring its actual height to ninety feet or better. The diameter at breast height is thirty-one and two-tenths inches. The ridges of the bark are four to five inches from trough to crest.

Western New York:—

Pinus rigida Mill., the pitch pine, has never been located in Western New York, according to the manuals. Lumbermen and old settlers, in the vicinity of Allegany State Park, were aware of this tree although they were unfamiliar with its name. From all reports, it occurred sparingly along the Allegany river and was cut along with the Hemlock and the White Pine, in the lumbering operations so widespread and so destructive here. At least two specimens are left; one near the Quaker Run nursery and the other up Crick's Run. In this connection it may be wise to mention the fact that an experimental planting of one thousand pitch pine transplants were set out in a slashing up Vater Hollow, in the Park.

Thelypteris marginalis (L.) Sw. var. *elegans* J. Robinson seems to be a new record also. A single plant, unusual because of its bifurcating fronds was located in the township of Clarence on November 20, 1933.

Two forms of the Christmas fern, *Polystichum acrostichoides* (Michx.) Schott., were located in the Allegany State Park during the summer of 1933. These are forma *lobatum* and forma *revolens*.

Epilobium angustifolium L. forma *albiflorum* (Dumort.) Haussk. has been collected in the Allegany State Park, for the first Western New York record. A search the following year failed to disclose any signs of it, which corroborates the theory that it reverts to the species and hence is not stable.

Dermatocarpon miniatum var. *complicatum* (Lightf.) Th. Fr., an aquatic lichen, may also be mentioned as a new record in this end of the state. It grows on submerged rocks in the Red House brook, just north of the beaver dam.

I should like to offer my sincere thanks to the many friends who have aided me in determining the above mentioned specimens. Especially helpful were Mr. John Parlin of Canton Point, Maine; Dr. Homer D. House of the New York State Museum; Dr. John Schaffner of Ohio State University; Rev. Fred Grey of Phillippi, West Virginia; Mr. Charles Weatherby of the Gray Herbarium, and Professor William P. Alexander of the Buffalo Museum of Science.

Allegany State Park
Red House, New York

A Tertiary Ginkgo from Patagonia

Edward W. Berry

With the discovery to which this note is devoted the Ginkgo has now been recorded from all of the continental areas. Its most extensive range appears to have been attained in the middle Mesozoic. Tertiary species have heretofore been unknown outside the Northern Hemisphere, where they have survived in western Europe as late as the Pliocene and in Asia and North America as late as the Miocene. The latest Arctic occurrences I regard as older Tertiary.

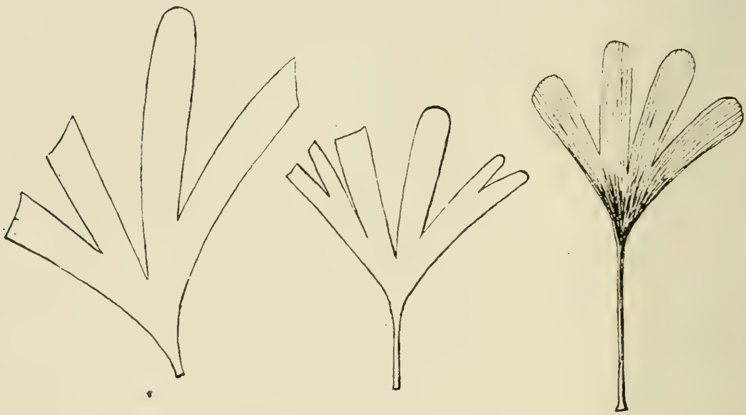
In a collection of fossil plants from northern Patagonia which reached me last spring are a considerable number of leaves of a new species of Ginkgo. This material comes from Rio Pichileufu about 30 miles east of Lago Nahuel Huapi in Rio Negro Territory, the locality being about 41° 10′ south latitude and 70° 52′ west longitude. The matrix is a fine grained andestic tuff and the preservation is excellent.

This species may be named **Ginkgo patagonica** and described as follows: Leaves variable in size, long petiolate, fan shaped with a cuneate base, divided by a sharp median sinus which extends $\frac{3}{4}$s to $\frac{4}{5}$s of the distance to the base into 2 primary segments. Each of these is invariably divided by a sharp but less deep sinus into 2 equal round-tipped segments. In about half the specimens this represents the maximum dissection. In the remainder the outer segments are bisected to a greater or less degree. The leaf substance is fairly coriaceous and the veins are largely immersed. The veins are stout and the venation is typical of the genus, except the outer marginals are not so prominently differentiated as is usual in the existing *Ginkgo biloba*.

The petiole is stout and striated, slightly expanded at the base and measures 4 centimeters in length in the only complete specimen, in which the lamina is 5 centimeters long and about the same in maximum width. The cuticles are preserved in most of the specimens but had been allowed to dry and slack for several years before coming into my hands, and hence it has been impossible to make sufficiently good cuticular preparations for photographing. The cell outlines are quadrangular more often

than polygonal; the walls are wavy and rather heavily cuticularised.

Although Ginkgo has not heretofore been recorded from South America, the allied Mesozoic genus Baiera has on several occasions, as by Kurtz from the Rhaetic of Mendoza and by Halle from the Lower Cretaceous of the Lago San Martin region. As has been frequently pointed out, and as Halle remarks in discussing the latter, the distinction between the leaves of Baiera and those of Ginkgo is very vague and a considerable number of forms have been described which could be referred



Sketch of three specimens traced from photographs. $\times\frac{2}{3}$.

to either. In general Baiera has a shorter petiole, a narrower base and a more dissected lamina and is unknown in post Mesozoic time. On the other hand the leaves of the existing *Ginkgo biloba* in what has been called localized situations, such as in proximity to fruits, on shoots from the trunk or old branches, etc., are frequently as dissected as the present Patagonian species, or a number of Mesozoic forms that have been referred to Baiera. I know of no consistent features that can be applied to these intermediate forms, but since the present species comes from the latter half of the Tertiary I feel sure that it should be referred to Ginkgo rather than to Baiera, although it is just to remark that there would be little difficulty in deriving it from the Lower Cretaceous form from South America which Halle calls *Baiera* cf. *australis* M'Coy.[1]

This South American Ginkgo is associated with an abundant arborescent flora which is chiefly dicotyledonous, but which contains several ferns, an abundant cycad belonging to the genus Zamia, and conifers representing the genera Araucaria, Fitzroya, Libocedrus and Podocarpus. There are also a few fruits and seeds, cyprinodont fish scales and insect remains; the latter chiefly beetle elytra.

The picture presented by this flora is in striking contrast to the present day conditions in this region, which is now a windblown treeless pampa with an annual precipitation of less than 20 centimeters. The ecological picture of the Miocene conditions has not yet been fully worked out since the identification of some of the elements, especially among the dicotyledons, is unusually difficult.

One is tempted to say something of the ancestry of the Ginkgo but this fascinating subject has been discussed repeatedly in recent years. One thing the present discovery emphasizes is the paucity of our knowledge of Cretaceous and Tertiary floras in South America and that this is due, not so much to their lack, as it is to the pitifully small amount of geological exploration.

THE JOHNS HOPKINS UNIVERSITY,
BALTIMORE, MARYLAND

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[1] Halle, T. G. Kgl. Svenska Vetens-Akad. Handl. Bd. 51, No. 3, p. 37, pl. 4, figs. 23–30; pl. 5, figs. 1–4, 5 (?), 6 (?), 1913.

An unreported host of Phoradendron

Louis C. Wheeler

Of the numerous hosts for the several species of *Phoradendron* (Mistletoe), some of which are rather omnivorous, no species of *Adenostoma* seems ever to have been reported as a host. I have collected *Phoradendron villosum* Nutt. var. *rotundifolium* Trelease (if the var. is to be recognized) twice on *Adenostoma fasciculatum* H. & A.: First, Gleason Canyon at Aliso Canyon Road, Alt. 3,000 ft., San Gabriel Mts., Los Angeles Co., Calif., *#610*, Apr. 10, 1932. Several infested individuals of the Adenostoma were seen. Specimens are in my herbarium and the herbaria of California Academy of Sciences and Pomona College. Second, two miles above mouth of Agua Dulce Canyon off Soledad Canyon, Alt. 2,200 ft., Los Angeles Co., *#1484*, Feb. 23, 1933. Only one specimen was found and that is in my herbarium. These two stations are only about 10 miles apart. In both places this Phoradendron commonly infests *Quercus dumosa* Nutt. approaching var. *turbinella* Jepson. While this area is in the cismontane drainage it has the desert influence evidenced by *Juniperus californica* Carr.

La Verne, California

AZOLLA IN NEBRASKA

N. F. Peterson

Recently I read the article by Mr. R. H. Torrey, *Azolla caroliniana* survives in Queen's kettle-hole pond, (Torreya, 34, page 11) and it occurred to me that another case of Azolla persisting for a long time where one would scarcely expect to find it might be of interest. Last summer driving south from Thedford I stopped to fill the radiator at the Dismal River. To my surprise the pailful of water from the edge of the river was full of Azolla.

This was probably not far from where Dr. P. A. Rydberg collected *Azolla caroliniana* at Plummer Ford 41 years ago. So far as I know Blue Creek in Garden County is the only other locality in Nebraska where Azolla has been reported to occur as a native plant.

University of Nebraska
Lincoln, Nebraska

Remarks on the name *Sarracenia laciniata* Kerner

Harold N. Moldenke

The name *Sarracenia laciniata* apparently occurs for the first time in botanical literature in A. J. Kerner von Marilau's "Pflanzenleben," edition 1, volume 1, published in 1887. It is not accompanied by any diagnosis or description and occurs only in the legend (figure 3) under the illustration of several insectivorous plants which is found on page 118. It is apparently mentioned nowhere else in the text and is therefore a splendid example of what is known technically as a hyponym. Although effectively published (perhaps unintentionally) by Kerner at this point, its publication cannot be considered valid according to the international rules of nomenclature as adopted by the great majority of the botanists of the world today. Kerner's book is a splendid textbook and has always been widely used in German-speaking countries. His figure, therefore, has certainly been seen by many hundreds of botanical students and professors, and, indeed, has been widely copied by authors of other texts.

The next mention of the name is in the second edition of Kerner's text, published in 1890. This was followed, in 1894, by an English translation by F. W. Oliver, entitled "The Natural History of Plants," where, on page 127 of the first volume, Kerner's illustration is copied and where his name, *Sarracenia laciniata*, occurs again under figure 3. In the same year (1894) P. Constantin published his "Le Monde des Plantes" (as a part of A. E. Brehm's "Marveilles de la Nature" series), and here Kerner's illustration is again copied and his hyponymous name is again used (volume 1, page 97, figure 145).

In 1903 A. Hansgirg employed the same illustration and name in his "Phyllobiologie" (page 228), and in 1911 L. H. Pammel made use of both in his "A Manual of Poisonous Plants" (page 498). This was followed, in 1913, by the third edition of Kerner's "Pflanzenleben," where the same illustration is used and the name is repeated without correction (volume 1, page 311).

Three editions have thus far been published of R. M. Holman and W. W. Robbins' very popular work entitled "A Text-

book of General Botany" and in each one Kerner's illustration is again reproduced, with the name *Sarracenia laciniata* in the explanation beneath it (ed. 1, p. 206. 1924; ed. 2, p. 231, fig. 168. 1927; ed. 3, p. 223, fig. 171. 1934). O. Stapf, in his "Index Londinensis" (volume 6, page 7. 1931) records the name and cites six of the references just enumerated.

In spite of its occurrence, thus, in eleven books, several of which are, or have been, among the most popular and widely used textbooks of general botany, the name *Sarracenia laciniata* has never been recorded in the "Index Kewensis" or in any of its eight supplements issued to date, nor does it occur in J. A. Clark's "Card Index of Genera, Species, and Varieties of Plants Published since 1885," although the genus is strictly American. These omissions are most remarkable because surely hundreds of botanical students, professors, and research workers must have seen the name in one or more of the references cited above. The name is used, as we have seen, in botanical textbooks written in German, English, and French, and not one of the books cited is an obscure publication. Its omission cannot be due to its being a mere hyponym, because hundreds of hyponyms are recorded in these two invaluable indices, as, for instance, the many names published by N. Wallich in his "A Numerical List" (1829–1832) and by Glaziou in Mémoires 3 of the "Bulletin de la Société Botanique de France," volume 58, pages 1–661 (1911–1912). Its omission can apparently only be accounted for by the assumption that no one of the hundreds who saw the name in print in their textbooks ever took the time or trouble to hunt it up in these indices to find out more concerning the plant to which it was applied, or, if they did and found that it was not therein included, no one ever took the trouble to write to the editors of these indices concerning it, because if they had it would surely have been subsequently included, since the editors of these works are always very glad to have omissions called to their attention. This obvious lack of interest on the part of the users of these textbooks (including teachers as well as students) does not speak very highly of their initiative, scientific curiosity, or desire for accuracy.

What is still more amazing, however, is that the name appears nowhere in J. M. Macfarlane's supposedly complete monograph of the *Sarraceniaceae* in volume 4 of A. Engler's

"Das Pflanzenreich" (no. 110. 1908)! In the opinion of the present writer a monograph of any genus or family of plants should dispose of *all* names ever proposed within that group, whether these names were validly published or not. Hyponyms, *nomina nuda*, and cheironyms (herbarium names) are continuously encountered by systematists in their daily work, and while none of these names have any botanical standing, yet there is never one of them encountered without a question arising in the mind of the systematist who has found it, as to just what the correct name is for the plant to which this untenable name was applied. It should be one of the purposes of a scientific monograph to bring all such names together, as well as all validly published names now relegated to synonymy, and to dispose of each one under its appropriate species. When a systematist refers to a recently published scientific monograph of a genus or family he has the right to expect to find therein *all* names ever proposed in that group up to the date of publication of the monograph. It is to be hoped that the next treatment of the *Sarraceniaceae* for "Das Pflanzenreich" will be more complete in this respect, and therefore more useful than the last edition.

Another most remarkable fact in this connection is that in all three editions of Holman & Robbins' textbook the illustration of the so-called *Sarracenia laciniata* is lettered "B," while in each case the legend beneath the figure refers the name *Sarracenia laciniata* to "C." This brings about a most deplorable confusion, because figure "C" represents the California pitcherplant (*Chrysamphora californica*), there incorrectly called *Darlingtonia californica* and referred to "B." One would suppose that at least one of the many users of these texts would have noticed this error and would have taken the trouble to write to the authors concerning it, so that it could be rectified in the next edition. Likewise in all three editions the name *Sarracenia variolaris* is used for figure "A," when it has long ago been shown that this name is not tenable and all contemporary workers use the older name, *S. minor*. It would be a good plan, indeed, in the opinion of the present writer, if the authors of textbooks which are not works on taxonomy, would submit their manuscript to a taxonomist before publication, so that he could bring their scientific names up to date!

Finally, for the benefit of those interested in pitcherplants,

it should be said that the plant illustrated by Kerner and to which he applied the hyponym, *Sarracenia laciniata*, is apparently the well-known *S. Drummondii* Croom of the southeastern states, ranging from northwestern Florida to Mississippi and western Georgia and known locally as "purple-trumpet" or "fiddler's-trumpet." The name *S. laciniata* should, therefore, henceforth be relegated to synonymy under *S. Drummondii*.

The New York Botanical Garden

FIELD TRIPS OF THE CLUB

Wawayanda Cedar Swamp, New Jersey, December 2, 1934

A party of ten members and guests visited the white cedar swamp on the Wawayanda plateau in New Jersey in search of mosses and lichens on December 2. A light rain the previous evening had brought these plants to their full freshness and they appeared in abundance.

The "hieroglyphics" lichens, *Graphis scripta* and *G. recta* were very common. The latter was found on birch and has the fruit or apothecia more or less parallel to the lenticels of the bark. A light gray crust on tree trunks was identified as *Pertusaria communis* with two to several apothecia sunken in the warts on the surface. A similar species, but with a zonate margin, was *Pertusaria velata*. *Buellia myriocarpa* was common as a green crust with small black apothecia on trees. Among the lichens, however, a rare find was *Calicium polyporeum*. This parasite on the common *Polystictus versicolor* has no visible thallus and its fruit appears as rows of tiny "nails" on the upper surface of the fungus bracket.

Parmelias were very common in the vicinity; *Parmelia conspersa*, *P. rudecta*, *P. caperata* and *P. physodes* being seen. Other foliose lichens seen were *Cetraria atlantica* and *Nephromopsis ciliaris*, which is similar but has cilia along the margin. Cladonias were in fine shape and robust colonies of *Cladonia cristatella*, *C. chlorophaea* and *C. bacillaris* were seen. A few plants of the *Cladonia rangiferina*, *C. furcata* and *C. verticillata* were found on the higher ground outside the swamp.

The moss *Georgia pellucida* was abundant and had both capsules and gemma cups present in numbers. In its characteristic location at the bases of trees, the common *Thelia hirtella*, with whitish peristome, was discovered. A few capsules of that unusual and most attractive moss, *Buxbaumia aphylla*, were found by members of the party. When fresh the capsule is a light translucent green and the peristome and stalk are a shining chestnut brown. The plant is usually found on a bare spot of soil and the practically leafless stalk springs from the persistent protonema which is dark green and easily recognized by the initiate. Al-

though this moss is spoken of as being quite rare in the New York region, it has turned up in many localities and is even locally common.

Liverworts were a conspicuous part of the swamp flora, especially along the old corduroy road which leads to the old iron furnace near Wawayanda lake. *Bazzania trilobata* was everywhere. *Ptilidium pulcherrimum* was also common, its hair-like leaves sometimes reddish brown, although usually green. Its capsules were fully formed, ready to burst into fruit with the coming of spring. The familiar *Marchantia polymorpha* of botanical laboratories also flourished on the old road. *Pellia epiphylla*, with a very thin thallus, inhabited several moist banks at the edge of the ruts in the road.

On the dry land, an island in the swamp yielded four species of club-mosses growing but a few yards from each other. *Lycopodium obscurum*, *L. complanatum*, *L. lucidulum* and *L. clavatum* were identified by the group. The latter species grew in a dense sward covering an area of several square rods.

JOHN W. THOMSON, JR.

PROCEEDINGS OF THE CLUB

Meeting of November 21, 1934

The Meeting of the Torrey Botanical Club was held at The New York Botanical Garden with an attendance of twenty-one.

Minutes of the meeting of October 17th were read and approved.

Mr. Darwin Levine, 2755 Morris Avenue, New York, and Miss Matilda Otero, School for Tropical Medicine, San Juan, Puerto Rico were unanimously elected to membership in the club.

The resignation of Mr. Christofer U. Lunder was accepted with regret.

It was thought desirable to have the second meeting in December a down-town instead of at the Garden as Dr. H. Hamshaw Thomas of Cambridge, England would be the speaker, and it would be more convenient for university students and teachers if the meeting were either at Columbia University or at the American Museum of Natural History.

Dr. Merrill suggested that it might be a good idea to arrange with some other clubs in the city for an annual dinner.

Dr. Norwood C. Thornton of the Boyce Thompson Institute for Plant Research gave an interesting talk on "Effects of Carbon Dioxide on Plant Tissues." This talk was illustrated by lantern slides.

Forman T. McLean
Secretary

Meeting of December 4, 1934

The meeting was held at the American Museum of Natural History with an attendance of 40.

Dr. George L. Zundel, Assistant Professor, Plant Pathology Extension, Pennsylvania State College, State College, Pa. was elected to membership in the club.

It was voted to hold the next meeting at Schermerhorn Hall, Columbia University, on December 18 at 8:15 p.m. to hear a lecture by Dr. H. Hamshaw Thomas of the Botany School, Cambridge University, on "The Origin of Flowers." By vote

of the club, also, the date of the first meeting in January was changed to January 8, the first Tuesday being New Year's Day.

For the scientific program Dr. Albert C. Smith, Associate Curator at the New York Botanical Garden, spoke on "Plant Collecting in Fiji," illustrating his talk with a series of beautifully colored lantern slides. The talk was followed by general discussion, with adjournment at 9:35 p.m.

Arthur H. Graves
Secretary pro tem.

Meeting of December 18, 1934

The Meeting was called to order at Schermerhorn Hall, Columbia University at 8:15 p.m. by President Hazen. There were one hundred and seventy-one present.

The following were elected to membership in the Club: Professor T. C. Frye, University of Washington, Seattle, Wash.; Professor Herbert C. Hanson, Department of Botany, N. D. Agricultural College, Fargo, N. D.; Mr. John H. Schaffner, Department of Botany, Ohio State University, Columbus, O.; Miss Ruth V. Schmidt, 620 Plankington Avenue, Cudahy, Wis.; Professor Thomas W. Whitaker, Agnes Scott College, Decatur, Ga.; Mr. Hans Wilkens, 241 South 11th Street, Reading, Pa.

The resignation of Professor C. B. Atwell, 901 California Street, San Francisco, Calif. was accepted with regret.

Dr. Edmund W. Sinnott of Barnard College, Columbia University was unanimously designated as the nomination of the Club for official delegate of the United States to the International Botanical Congress at Amsterdam this summer.

Dr. H. Hamshaw Thomas of The Botany School, Cambridge, England gave an interesting talk on "The Origin of Flowers." This talk was illustrated by lantern slides.

Forman T. McLean
Secretary

NEWS NOTES

At the annual meeting of the Torrey Botanical Club in January it was decided to establish a new type of membership—Field Membership—for those who might wish to go on the field trips of the club. Last year nearly one hundred regular trips were scheduled. The cost of the new membership will be two dollars.

New leaders desired for field trips. Both old and new members of the club are invited to offer suggestions regarding one day or week-end trips to places within easy reach of the city. It is especially desired to have leaders to places of interest that have not been visited by the club. Those who are willing to lead or who will offer suggestions regarding trips are asked to communicate with the chairman of the field committee, Raymond H. Torrey, 99-28 193rd Street, Hollis, L.I., N.Y. before March 1st.

On the recommendation of Director Merrill, the Board of Managers of the New York Botanical Garden at its annual meeting on January 14th, designated the general herbarium of the institution as the "Britton Herbarium, New York Botanical Garden," in honor of Dr. N. L. Britton, late director of the institution. The building up of the reference collections was peculiarly close to Dr. Britton's heart. During his lifetime he saw the great reference collections of botanical material built up from the nucleus of the Torrey Herbarium of Columbia University, perhaps 400,000 specimens, deposited at the Garden in 1899, to a total of 1,774,687 specimens, a collection particularly rich in types and in historical material. The herbarium is now the second largest in America and one of the great herbariums of the world. Precedents for the action are found in the designation of the fern herbarium of the Garden in 1907 as the "Underwood Fern Herbarium" in honor of Professor L. M. Underwood, and of the moss herbarium as the "E. G. Britton Moss Herbarium" in 1934. During 1934 a total of 70,170 specimens were poisoned, mounted and distributed into the herbarium.

The first number of a new botanical monthly appeared in January—The Botanical Review, edited by H. A. Gleason and E. H. Fulling of the New York Botanical Garden. The first number contains an article by Dr. L. O. Kunkel on Possibilities

in Plant Virus Classification, and one by Dr. William Seifritz on the Structure of Protoplasm. Articles are to be contributed only on the recommendation or suggestion of the editors or advisory editors. The fields of botany represented by the advisory editors indicate that most fields of botanical research will be covered. The advisory editors are: paleontology, Dr. R. W. Chaney; ecology, Dr. W. S. Cooper; anatomy, Dr. A. J. Eames; mycology, Dr. R. A. Harper; taxonomy, Dr. F. W. Pennell; cytology, Dr. L. W. Sharp; genetics, Dr. E. W. Sinnott; phycology, Dr. Gilbert Smith; pathology, Dr. N. C. Stevens; morphology, Dr. R. B. Thomson; physiology Dr. S. F. Trelease.

The Federal Government has purchased the nut arboretum of William C. Bixby, at Baldwin, L.I. The trees include black and Japanese walnuts, butternuts, hickories of several species, filberts of various sorts and hybrids of many varieties and species. The trees will be distributed to the National Arboretum in Washington, the Forest Service Nursery at Troy, N.C., and the Division of Forest Pathology. To the latter will go some 1,000 disease resistant chestnuts for reforestation in the areas where the chestnut blight has killed all the native chestnuts.

The Botanical Society of America at the annual meeting in Pittsburgh during Christmas week, elected the following officers: President, Dr. Aven Nelson, University of Wyoming; Vice-president, Dr. K. M. Wiegand, Cornell University; Secretary, Dr. Loren C. Petry, Cornell University; Treasurer, Dr. H. A. Gleason, New York Botanical Garden.

Professor R. A. Emerson, of Cornell University, is spending part of his sabbatic leave in Yucatan with J. H. Kempton, of the U.S. Dept. of Agriculture, in a study of wild relatives of Indian corn, *Zea Mays*. It is hoped to find material of interest in a study of the genetics of maize. After the trip to Yucatan, Professor Emerson will visit laboratories of genetics in California and other western states.

THE TORREY BOTANICAL CLUB

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OF THE

TORREY BOTANICAL CLUB

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A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 61, published in 1934, contained 546 pages of text and 32 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

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Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.

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TORREYA

A Bi-Monthly Journal of Botanical Notes and News

EDITED FOR
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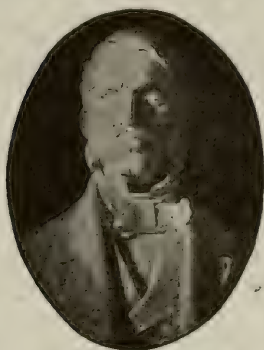
BY
GEORGE T. HASTINGS



John Torrey, 1796-1873

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TORREYA

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Where our food plants came from

E. D. Merrill

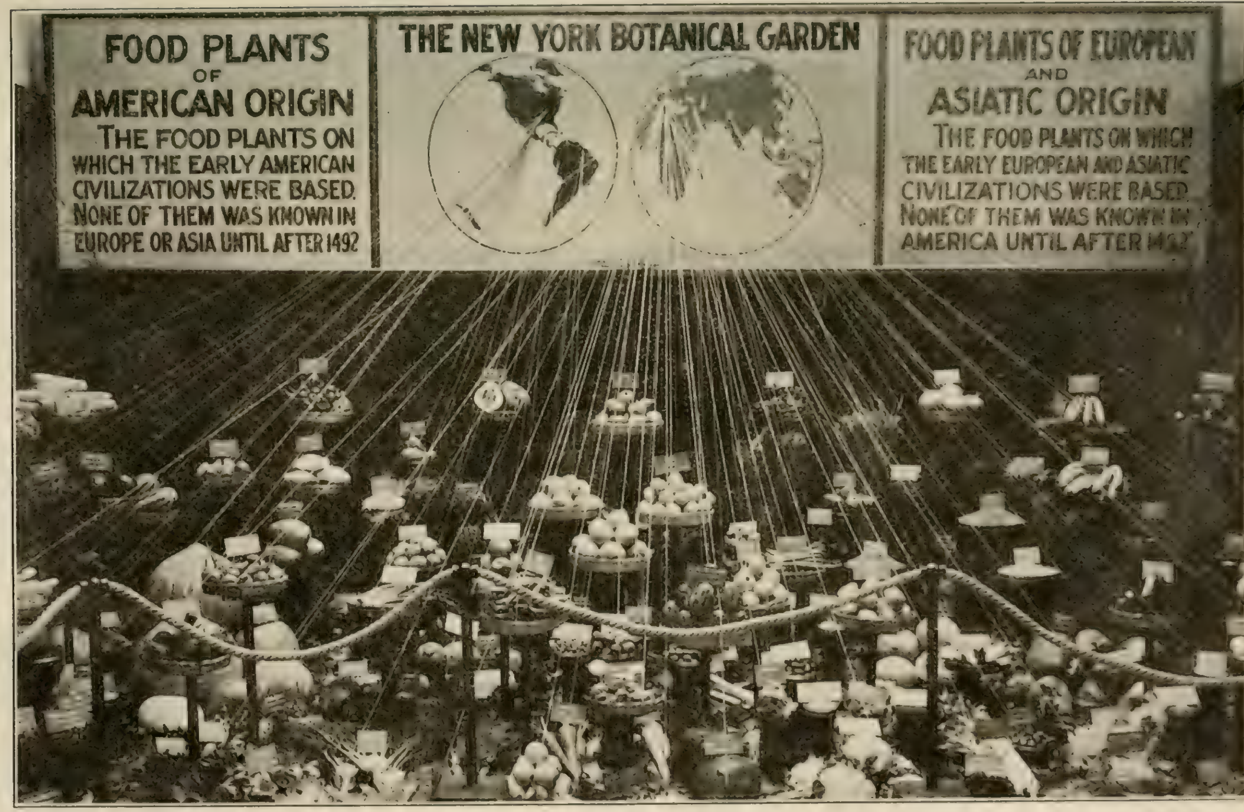
It is an obvious fact that all cultivated plants and all domesticated animals were derived from wild ancestors. The average individual scarcely realizes that agriculture is a very ancient art, and that every basic plant now cultivated for food, and most of those of minor importance as well, were already in cultivation somewhere in the world at the dawn of recorded history. The same statement applies equally well to our domesticated animals for they likewise are very ancient in domestication. The plants and animals domesticated by more or less primitive man, whether in America, or Europe, Asia or Africa were, until comparatively modern times, limited in distribution to either the eastern or the western hemispheres as the case may be. It was not until after the discovery of America in 1492 and the voyage of Magellan around the world in 1520 that the interchange of economic plants and animals between the two hemispheres commenced; until that time the cultivated plants originated in North and South America were confined to these two continents, and the same statement holds true for the larger number originated in Eurasia. While primitive man reached practically all parts of the world where conditions were favorable to his continued existence, he did not, as he advanced in culture, transmit his cultivated plants and domesticated animals beyond the limits of the one hemisphere or the other with very minor exceptions. In other words the Pacific and Atlantic formed a barrier to trans-oceanic communications between America and Eurasia until the close of the fifteenth century.

The cultivated food plants and domesticated animals form the very basis of agriculture and agriculture is basic to civilization. While modern man has greatly improved his cultivated plants, increased their yields, and extended their ranges, he has not added a single important one to the long list of species

selected and domesticated by our remote ancestors. Agriculture is so ancient that for certain species, notably maize in America, the wild-growing form from which it was derived is not known with certainty.

We seldom give a thought as to whence our basic food plants came, when, where and by whom they were first cultivated, and how, when and by whom they were disseminated. If we think of corn, we are apt to think of Iowa, or some other producing region; if wheat, then Dakota or Minnesota; if oranges, grapefruit, or lemons, then California or Florida whence our market supplies chiefly come; if potatoes, then Maine or Idaho, or some other region producing outstandingly good varieties; if apples, then Maine, or New York or Michigan or Oregon, or almost any other producing region in the United States. We are influenced by our current knowledge of the chief producing areas as far as our own markets are concerned. But where did these plants originate?

If we examine the origins of cultivated plants we soon learn that the great majority of the several hundred cultivated species came originally from certain very restricted parts of the world. Much of Europe, a large part of Asia, most of Africa, all of North America north of Mexico, and all of Australia contributed little or nothing of importance, although all of these regions support a varied native vegetation. Most of the cultivated species are natives of definitely limited areas, some in America, some in the Old World, and the most important food plants originally occurred as native species in or near those regions that developed the earlier civilizations, whether in Eurasia or in America. As outstanding centers of both the origins of cultivated plants, of domesticated animals, and of early high civilizations we may mention the high lands of Mexico and of Bolivia and Peru in America, certain parts of the Mediterranean basin in Europe, Asia Minor, central Asia, and certain parts of India and China in Asia. It is from these restricted areas that most of our important food plants and domesticated animals came, and it is these same relatively limited regions that produced the several ancient civilizations. In Mexico the basic foods were maize or Indian corn, the sweet potato, beans, squashes, pumpkins, and others of lesser importance, in Bolivia and Peru the potato, lima beans, some forms of common beans,



The New York Botanical Garden's exhibit at the Fall Show of the Horticultural Society of New York, 1934, suggests local school exhibits based on market material. This exhibit was repeated in March, 1935, at the Philadelphia Flower Show.

and numerous other food plants of lesser importance. In the various centers of Eurasia the most important primitive foods were the true cereals, such as wheat, barley, rye, oats, millet, rice and others of minor importance, buckwheat, and most of our temperate zone vegetables and fruits.

Agriculture in America developed along exactly the same lines as in Europe and Asia, except that in America domesticated animals were very few—the llama, alpaca, turkey and the Muscovy duck—and again the plants selected from among the native species that yielded edible seeds, fruits or tubers, were totally different from those of Europe and Asia. Here, as in various parts of the Old World, we find dry land agriculture, terrace agriculture, and extensive irrigation systems. To contrast the differences in cultivated plants and in plant products between America and Eurasia there is listed below two series: First those plants developed as cultivated ones from native American species, none of which was known in Europe or Asia until after the close of the fifteenth century; and second a longer list of those characteristic of Europe and Asia, none of which was known in America until after the arrival of the European explorers and colonists.

In contrast to the numerous cereals developed in the Old World from native wild grasses, America produced but one, but this the most important maize or Indian corn. Other food plants include the potato, sweet potato, tapioca or cassava, arrow root, lima bean, all varieties of garden and field beans, the scarlet runner bean, tepari bean, yam bean, tomato, pepper, Jerusalem artichoke, sunflower, squash, pumpkin, fig-leaved pumpkin, musky pumpkin, peanut, chayote, papaya, quinoa, avocado, pineapple, custard apple, soursop, cherimoya, guava, cacao or chocolate, cashew, sapote, white sapote, sapodilla, mammei, Mexican plum, and various others of lesser importance. In ancient Peru alone over seventy different species were actually in cultivation, all derived from native species, before the advent of the Europeans, and probably at least as many were also in cultivation in Mexico. To mention only corn, potato, sweet potato, pepper, the beans, tomato, squash, pumpkin and cacao, one quickly realizes Americas' great contribution to the cultivated plants of the world, and how important these items now are to the every day life of most peoples in all parts of the world.

Eurasia, particularly Asia, as contrasted to America, yielded a much larger number of cultivated food plants than did America, as well as most of our domesticated animals such as cattle, horses, camels, water buffalo, yak, sheep, goats, swine, hens, pigeons, and most kinds of ducks. Other than maize, all of the cultivated cereals originated in the Old World, including wheat, barley, rye, oats, millet, Italian millet, pearl millet, sorghum, rice, teff, ragi and coix. Other cultivated species include buckwheat, turnip, cabbage, rutabaga, rape, chard, mustard, Brussels sprouts, radish, beet, parsnip, carrot, onion, garlic, leek, shallot, spinach, egg-plant, lettuce, endive, chicory, salsify, celery, asparagus, globe artichoke, pea, soy-bean, cow-pea, chick-pea, pigeon-pea, lentil, broad-bean, hyacinth bean, asparagus bean, taro, yam, sugar cane, sesame, and various others. Among the fruits may be listed the apple, pear, plum, cherry, European grape, apricot, peach, prune, olive, fig, almond, jujube, melon, water melon, cucumber and in the more tropical regions the banana, coconut, orange, lemon, lime, pomelo, date, mango, mangosteen, bread fruit, jak-fruit, rambutan, litchi, longan, and others. Practically all of the cultivated hay and fodder plants so essential to the dairy industry, including all of the cultivated grasses except maize, as well as the clovers, alfalfa, and other commonly planted hay crop plants are of Eurasian origin. It is well again to emphasize the fact that not one of these were known in America until after the arrival of the Europeans, and with us they represent introductions since the beginning of the sixteenth century.

If we contrast the American and Eurasian lists it will be noted that most of the cereals, most of the temperate zone cultivated fruits, and most of the vegetables are of Eurasian origin, yet in all three categories America made notable contributions. The two lists of plants in themselves comprehensive enough, and sufficiently diversified to serve independently as the basis of an agriculture in America, and in various parts of Eurasia, on which, it was possible to build real civilizations, yet civilizations, in the two hemispheres, that were utterly independent of each other. The available data on the origin and dissemination of cultivated plants may be interpreted as supporting entirely and without exception the idea that as agriculture originated in America utterly independent of Old World contacts on the basis of strictly native American species, so the pre-

Columbian civilizations in America, based on this indigenous agriculture, were developed independently of Eurasian contacts. It was only after the end of the fifteenth century that Europe and Asia in any material way effected the development of civilization in America.

The rather large public that believes implicitly in Atlantis and the similar group that support the idea of Mu—assumed ancient continents or island groups in the Atlantic and Pacific basins through which cultures were disseminated in both hemispheres—as well as the extreme diffusionists among the anthropologists who would derive all culture from a common center, must continue to ignore the evidence supplied by the origin and distribution of cultivated plants. Had there been any considerable contacts between America and Eurasia in pre-Columbian times, man would have inevitably transmitted the basic food plant from one hemisphere to the other. There is no evidence that this interchange of cultivated plants commenced before the period of European colonial expansion in the 16th century.

New York Botanical Garden
New York, N. Y.

Fungus flora of a front lawn

LAURA A. KOLK

It has been my interesting experience during the past three months to discover the value of the "back yard" or better, "the front yard" of a suburban home as a collecting ground for fungi. Since mid-August I have been collecting at the home of my brother, about thirty miles out on Long Island, from New York city, and have found to date twenty-three different species of fleshy fungi in the grass on the open lawn, under shrubs and evergreens, and also under the porch of the house—an area having a frontage of approximately sixty-five feet and extending back forty feet to the house line. A neighbor's lawn and shrubbery yielded five more species.

Some of the more striking finds were three specimens of the dog stinkhorn, *Mutinus caninus*, found September 16 and 23 on the open lawn, and at least twenty specimens of *Amanita muscaria* which appeared during the same time beneath the trailing branches of a blue spruce tree, and of a hemlock nearby. Some of the Amanitas had stipes an inch in thickness, and pilei six to eight inches in diameter.

At different times there were also found in the grass, *Clitocybe laccata* var. *amethystina*, *Russula heterophylla* (or variata?), *Russula foetens*, *Amanitopsis vaginata*, and two Ascomycetes, *Xylaria polymorpha* and a very tiny, reddish black, bristly cup fungus which I have tentatively identified as *Patella albo-spadicea*. These two Ascomycetes were discovered in August when there were few fungi to be found, but abundant rainfall in September especially over week-ends, when the collecting was done, probably accounted for the numerous fungi found later. The cup fungus was present on bare patches of soil continuously from August through October, as were also *Scleroderma vulgare* and a smoother skinned puff-ball growing with it. Another fungus, which made its first appearance in September, and then continued to appear in numbers through October, was *Coprinus* micaceus. A single specimen of *Hypholoma sublateritium* appeared October 28.

Under the porch were found on September 23, several beautiful specimens of the chestnut Boletus, *Boletus castaneus*, with

its tawny cap upturned at the edge, showing the creamy white tubes beneath, and nearby on a piece of rotting wood, the erect, gelatinous sporophores, orange in color and not more than three-fourths of an inch tall, of a Guepinia. A solitary grayish brown Agaric with a cap two and one half inches in diameter and a stipe three and one half inches high, rooting at the base, showed yellowish brown spores under the microscope, but could not be identified. It was found September 23. A second search beneath the porch on October 28, yielded another brown-spored Agaric growing in a cluster of about ten specimens (caespitose habit) in approximately the same spot as the earlier solitary specimen, but although the color of the cap was somewhat similar, these later plants were smaller and more slender. Doubt as to the presence of an annulus on the stipe prevents me from placing this latter specimen in its proper genus. I think it is either *Pholiota aggericola* or a *Cortinarius*.

Five interesting species were found growing under evergreen trees and shrubbery. Besides the Amanita already mentioned as growing under the blue spruce, a tree about 20 years old, I found *Boletus edulis*, two specimens on September 15, *Clitocybe pinophila*, tentatively identified, on September 30 and October 14, and a white spored Agaric with a shining chestnut brown cap when moist, most likely a *Collybia*. Two species of Inocybe appeared during September and continued to appear throughout October. The one, which grows on bare soil beneath a rhododendron shrub, I have identified finally from Peck's Monograph on the Inocybaceae (State Botanist's Report of New York, 1909, pg. 48) as *Inocybe infelix;* the other growing beneath a hemlock, I was inclined at first to consider the rare *Inocybe agglutinata*, but believe now that it is *Inocybe eutheloides*.

The delicate little reddish-orange *Mycena acicula* with a stipe slender as a hair, found in September among moss in a shaded part of the lawn and an abnormal form of *Clitocybe laccata* complete the collection. The neighboring lawn yielded the edible mushroom, *Agaricus campestris*, two species of *Lepiota*, *Paxillus involutus*, and a white *Clavaria* with numerous solitary sporophores, forking slightly at the tip, about one inch tall.

Brooklyn College
Brooklyn, N. Y.

Two hardy bamboos of East China

W. M. Porterfield

Among the less conspicuous bamboos of East China are two species whose hardy nature fits them to the wild hill-top region where they are mostly found. Over the hillsides around Soochow, Wusih, Hangchow and Zakow the tough cane brakes of the exposed places are made up of either one or the other or both of these species. Both of them are small but for all that they pass through the rigours of cold and wind with all leaves "waving," as it were; their green foliage brilliant in the sun, a constant reminder that life though dormant is ever present.

The first of these species is *Arundinaria nitida* Mitford, the Brilliant Bamboo. The first description of it was made by A. B. Freeman-Mitford, C. B., in Gardeners' Chronicle, xviii, p. 186, in 1895. In this account the specific name "nitida" was given. In the Bamboo Garden (1896) by the same author an exceptionally fine account of this same species is given (p. 73). It appears that it was first discovered in Messrs. Veitch's collection at Combe Wood, England. After much confusion and numerous misnamings its history was unearthed. In 1889 Dr. Regel, Director of the Botanic Garden of St. Petersburg sent Messrs. Veitch seed which had been collected by a Russian traveller, Mr. Potanin, in North Szechuen. Some of the seed grown under glass in St. Petersburg shows it to be the same which appears in Mr. Veitch's collection. This interesting fact bears out a general theory held by the then Director of Kew Gardens to the effect that hardy bamboos may be expected to have developed and penetrated into Northwest China as part of an extensive spread of the Himalayan Flora.

A technical description of *Arundinaria nitida* may be found on p. 33 of Les Bambusées by E. G. Camus (1913), but herewith I append my own observations which will enable those who tramp over the hillsides to identify it. It constitutes a scrubby growth over open land populated by occasional conifers giving some shelter and shade as this species is a bit more retiring than the second one. In optimum conditions it grows to be 7½ tó 8 ft. or about 2.28 meters in height but is usually shorter. It has purplish culms with almost smooth, thinly stri-

ARUNDINARIA NITIDA

Reproduction of a drawing by Alfred Parsons from "The Bamboo Garden" by A. B. Freeman-Mitford C. B.

ated internodes. The latter are long and rounded in cross-section. The sheath scar just below the point where the branches emerge is furry and has a jutting ring-like ridge immediately below it. There is a whitish bloom, or powder, under each of the upper nodes.

The branches are short and begin with about the fourth node of the culm, the longest one of one foot length springing from the seventh node and ranging shorter above and below. There are four branches at a node with smaller almost erect adventitious branches originating between them. Sheaths are persistent on the branches and there are no branchlets. The first internode of the branch forms a sharp angle with the culm, the second bends away abruptly and the distal ones ascend curving inward at their ends.

The leaves are in terminal clusters of 3 to 4, with sloping leaf base and attenuate apex. The length is 10–14 cm., the width 1.3–2.0 cm. and they are deep green in color. No hairs appear at the throat of the leaf sheath. The edges of the leaf are smooth at the base but spinulose along both edges at the tip, a little below more so along one edge than on the other.

The second species is *Phyllostachys nidularia* Munro, the "Scrub Bamboo" which grows to about the same height as *Arundinaria nitida* but inhabits more exposed regions up to 2,500 ft. altitude. It was first described by Colonel Munro in Gardeners' Chronicle, ii, p. 773 in 1876. The technical description in Les Bambusées is found on p. 63. It is easily distinguished from the latter by its yellow culms, prominent nodes with dark band below each one, and its shorter zigzag internodes flattened on one side in the branching region. A papery membrane lines the hollow cavity of the internodes.

The branches are longer in proportion to the height of the culm than are those of the previous species and they begin at the fifth node, the length being two feet. The basal internode of the branch is solid, with only a pin-hold cavity in the others. Two branches spring from each node, one long and one small, the latter sometimes more erect. The twigs are shiny and purplish. At the nodes of the branches are also two branchlets, one large and one small. No adventitious branches appear in succeeding years.

The leaves are smooth, waxy, yellow-green, almost coria-

ceous, not withering when picked, and are in terminal clusters of two. They have a rounded base and an attenuate tip which dies back in the winter and is most always recurved The width is 1.4–1.7 cm., the widest part being $\frac{1}{3}$ the distance from the base. The length of the leaf is from 7–8 cm. One edge is finely spinulose and the blade is generally at right angles to the petiole. The leaf sheath has erect bristly hairs at the throat.

The reason the specific name "nidularia" which means "little nest," was given this species of bamboo is because of the resemblance of the inflorescence to a bird's nest. The compact head-like clusters of grassy flowers appear annually on special leafless shoots which are shorter then the others. I have found flowers in full bloom in January when the ground was covered with snow. Usually bamboos flower only after many years of vegetative growth and then all culms burst into flower, set seed and die. This apparent breaking up of the periodicity in this species is an indication of an evolutionary step tending to bring the life cycle more in line with the seasonal changes of modern times.

The Scrub Bamboo can be cultivated and trimmed into an effective hedge. Its branches are also cut by the farmers and made into coarse brooms. Without doubt it is the toughest growth to break through and the sharp stubble will pierce even shoe leather.

Both of these bamboos though belonging to different genera are monopodial, i.e., the culms spring singly from a running rhizome; they are about the same height; their leaves do not wither when picked, a test of a hardy bamboo; and they inhabit waste places. On the other hand they differ in the fact that *Arundinaria nitida* has purplish culms while those of *Phyllostachys nidularia* are yellow; that the former has short branches four or more in number while the latter has two which are longer and of unequal length; and that the length of the internodes of the former are longer than those of the latter. These two small bamboos are the commonest of the hardy bamboos of East China.

New York, N. Y.

Gentiana Andrewsii forma albiflora Britton in Allegheny National Forest, Pennsylvania

Sidney K. Eastwood

Tionesta Creek which lies largely in Forest County enters the Allegheny River at the southwest corner of the Allegheny National Forest. The river forms the western boundary of the area. The creek flows, in general, parallel to the river and distant some eight to ten miles until it reaches the village of Nebraska where it turns west to flow into the river. Between the two valleys is territory reaching elevations around eight hundred feet above the streams. The entire area was at one time covered with forest, largely coniferous, and is now growing up to second-growth hardwoods except for small areas on the hilltops and along the streams that are under cultivation or occupied by villages.

On September 6, 1931, Adam M. Barker and the writer found a single specimen of *Gentiana Andrewsii* forma *albiflora* Britton growing along the bank of Tionesta creek at Nebraska near a stand of the typical blue form. The specimen was collected as an oddity, one of those white forms of blue flowers that occasionally occur. On September 1, 2 and 3, 1934 we made another collecting trip to the Allegheny National Forest and visited many locations in the region. Along Blue Jay Run, a tributary to Tionesta Creek, at a point two miles from its mouth where Watsontown Run comes in, we again collected f. *albiflora* growing close to the water's edge in territory where the second growth forest is well established.

On the following day we found a stand of it at the side of the road upstream from Brookston where the Tionesta Creek valley widens and provides a flat area devoted to farming and pasture around the village.

From Barnes, downstream to Nebraska the valley is fairly narrow. Through this section a highway runs along the narrow area between the creek and the forested hillside. For a distance of several miles either side of Lynch, which is located at the junction of Blue Jay Run with Tionesta Creek, we saw f. *albiflora* growing abundantly in scattered stations along the road.

Exploration of the territory around a number of the stations

visited to determine if the white flowers were of occasional occurrence as in 1931 at Nebraska, failed in each instance to locate plants producing blue flowers. Along streams tributary to the Allegheny River on the other side of the divide we found blue flowers but failed to find the white.

The indication is that f. *albiflora* is well established in the Tionesta Creek Valley in Forest County and that, in this region, it reproduces regularly with white or cream-colored flowers without reversion to the blue form which is typical for the species, *G. Andrewsii.*

Pittsburgh, Pa.

Bibliographical Miscellany—I. On ambiguity in author abbreviations

JOSEPH EWAN

In the course of the preparation of a biography of the late Dr. Anstruther Davidson (Madroño 2: 124–128, 1934) I noted certain bibliographic confusion with regard to the citation of author abbreviations. Some further jottings along a similar vein made subsequently are here briefly discussed.

A. Davidson, author of more than fifty species and varieties of Californian and Arizona flowering plants, might conveniently be cited "Dav." but complications may arise from this practice. Dr. W. L. Jepson directed my attention to the fact that there seemed to be no competition for this abbreviation among the names of botanists. His examination of the works of Pritzel, Gray, Rydberg (where scholarly registers of authors are given on at least two occasions (1917 and 1932) by Dr. J. H. Barnhart), and Britton showed no apparent confusion arising from names with the three initial letters D-a-v. There is, however, one conflict offered by the name of the American pteridologist, George Edward Davenport (1833–1907), which is abbreviated in Willis' extended list of abbreviations (1931) as "Dav." It might be avowed that since the respective fields of work of the two botanists are so wholly discrete, Davidson at no time publishing, to my knowledge, a species among the Pteridophyta and Davenport likewise not entering the phanerogamic field as phytographer at any time, that it is idle to consider the coincident abbreviation.

It is worth while, nevertheless, to direct attention to the matter in the interest of attaining as early and complete uniformity as possible in the matter of author abbreviations.

Two objectives are borne in mind in the use of such abbreviations. Primarily, an abbreviation to be useful must be truly an abridgement designed to reduce the bulk of the whole, terse and clear, and not simply a lopping of the final letters of an author's name to afford a scant em or two per description. To illustrate, the name of the salicologist Andersson (1821–1880) is docked to "Anders.", in which case there's collision with the abbreviation for Thomas Anderson (1832–1870), director of the

botanic garden in Calcutta, or is scarcely bettered by the form "Anderss."—oddly enough the less used of the two forms though decidedly preferable. To return, the second objective, quite fully elaborated by Hitchcock (1925) p. 19, is naturally the avoidance of possible ambiguity. It is with this safeguard against "driving either" of two or more ways through botanical literature that we are immediately concerned.

Davenport is abbreviated in all works examined by me to the form "Davenp."—a clear, explanatory form. This abbreviation then is useful and free from misinterpretation. But since the danger of confusion in such trisyllabic names as Davidson, Anderson, Robinson, and so forth, is obviated on all occasions by spelling out these authors' names no abbreviation is recommended. In the case of "Davidson" its use in unabbreviated form has been well established by Abrams (1923) in all instances save occasional synonomy, by the Index Kewensis and the Gray Herbarium Card Index.

Another example of identical abbreviations as a possible source of error was noted recently in *Nepeta hederacea* (L.) Trevisan, abbreviated in the Index Kewensis (2:305) and appearing elsewhere (doubtless copied) as "Trev." This abbreviation is variously said to stand for Treviranus (1779–1864) or for Trevisan de Saint-Léon (1818–1897) or ? "Trevisano" of Willis' list (1931) p. 6. The last two explanations doubtless represent the same author but the first name is obviously distinct; the resultant confusion is apparent.

It may be noted that two-syllable names are quite generally abbreviated without a large chance of ambiguity, as "Chapm.," "Rupr.," "Trel." or "Hitchc." The last example illustrates another common neglect—the omission of initials when these would be useful, especially when one considers the increasing international character of systematic botany with the greater diffusion of printed matter and plant materials to foreign study centers. There the workers may be quite unfamiliar with an author whose name appears on a label or in a floristic work and the initials aid unquestionably in such situations. The duplication of rather infrequent names among botanists, aside from direct descendents, is certainly uncanny. Thus we must be concerned with A. S. and C. L. Hitchcock, with T. J. and J. T. Howell, with Thomas Nuttall and L. W. Nuttall, and with N.

L. Britton and James Britten (it is inadvisable to abbreviate these names, when standing alone, to "Britt."—a too prevalent practice).

University of California
Berkeley

Literature cited

1917 Rydberg, P. A. Flora of Rocky Mountains and Adjacent Plains. Publ. by author, N. Y. 1070–1077. (same for ed. 2, 1922.)

1923 Abrams, LeRoy Ill. Flora of the Pacific States. Stanford Press, Calif.

1925 Hitchcock, A. S. Methods of Descriptive Systematic Botany. John Wiley & Sons, N. Y. (cf. chap. 4.)

1931 Willis, J. C. Dictionary of Flowering Plants and Ferns. Cambridge Press, London. (sub "abbreviations.")

1932 Rydberg, P. A. Flora of Prairies and Plains of Central N. Am. New York Botanical Garden, N. Y. 904–913.

New York Botanical Garden Publication

"Flora of Bermuda" by Nathaniel Lord Britton and others, which was published by Scribner's in 1918, will henceforth be procurable from The New York Botanical Garden, Bronx Park, New York City, at the reduced price of $3.50. The book contains special sections on Mosses by Elizabeth G. Britton, Hepatics by Alexander W. Evans, Lichens by Lincoln W. Riddle, Fungi by William A. Murrill and Fred J. Seaver, and Algae by Marshall A. Howe.

Dr. Britton, who was the founder and for 35 years director of The New York Botanical Garden, bequeathed the rights of this volume to the institution.

The Botanical Garden has also this month reduced the price of "A Text-book of General Lichenology" by Albert Schneider, published in 1897, to $2.50, and has added Britton's "Manual of the Flora of the Northern States and Canada" (second edition, 1907) to its list of books on sale, offering it at the accustomed price of $2.50.

Other books published and handled by The New York Botanical Garden include P. A. Rydberg's "Flora of the Prairies and Plains of Central North America ($5.50) and H. A. Gleason's "Plants in the Vicinity of New York"—a simple key to the names of about 1,500 species of plants occurring in the New York area. This will appear in May and will sell for ($1.50).

BOOK REVIEW

A popular fern book[1]

A book to appeal to all lovers of plants, attractively bound, printed and illustrated.

All of the ferns and fern allies that have been found in the state (North Carolina) are described and illustrated with accurate line drawings of a frond as well as of small portions enlarged to show the sori. There is a simple key to families, under the families there are keys to the genera and for each genus there is a key to the species. Scientific terms are not avoided and there

[1] Ferns of North Carolina, H. L. Blomquist. XII plus 131 pp. Duke University Press, 1934. $2.00.

is no glossary but all of the terms used are explained in the introduction. Seventy-six species are described, including 3 species of Equisetum, 8 of Lycopodium, 5 of Selaginella and one of Isoetes. Under Botrychium four species are described. Eleven species of Dryopteris, the largest genus in the state, are recorded, *D. hexagonoptern* being the only specie of the Phegopteris group though it is noted that *D. polypodiodes* has been reported from the state but no species have been located. The three spinulose forms are clearly separated both in the key and the drawings. One fern is described as an escape from cultivation, *Pteris multifida*, a slender form often grown in fern dishes, "in Florida and as far north as Wilmington it has escaped and is often found growing in the open especially on stone and brick walls. Native of China." Almost no varieties of the species are described. Most of the illustrations are evidently from herbarium specimens and the author has indicated the bent stems necessary to place large fronds on herbarium sheets, and in places the folding over of pinules in pressing. This is noticed most particularly in the illustration of the Narrow-leaved chainfern. A drawing from a fresh specimen would have been more accurate and pleasing.

George T. Hastings

FIELD TRIPS OF THE CLUB

March 17, 1935

This field meeting was attended by fourteen members and guests who hiked in the Pine Barren region northeast of Lakewood, N. J.

Along the borders of several cultivated fields the small plants of *Draba verna* or Whitlow Grass and *Stellaria media*, thec ommon Chickweed, were in full bloom. The former is interesting from its habit of producing cleistogamous flowers, and the latter, a hardy immigrant from the Old World, takes possession of all fields the minute cultivation ceases. *Scleranthus annuus* or Knawal, also naturalized from Europe, was abundant in fields near Lakewood having little awl-shaped leaves and spreading creeping branches. Though not in flower it might easily be mistaken for Mountain Pink.

The buds of *Acer rubrum*, *Populus tremuloides*, and a species of Salix had swollen noticeably, and staminate catkins of *Alnus rugosa* were hanging loosely in the breeze.

Species of red-fruited lichens on the borders of the sand roads were *Cladonia cristatella* mostly forma *vestita* and *beauvoisii*, some splendidly fruited cups of *Cladonia pleurota* and occasionally good specimens of *Cladonia macilenta* with little red tips. The brown fruited *Cladonia floridana* which reacts yellow upon application of KOH was very common. Less so was *Cladonia calycantha* which resembles *C. verticillata* but for its squamulose cups. This is a typical Pine Barren Lichen. We found several colonies of the tiny cactus-like *Cladonia papillaria* forma *molariformis* growing densely on the sides of the sand road. *C. rangiferina* and a form much denser but not as tall was also frequent. Others seen were *C. squamosa*, *coniocraea*, *verticillata*, and forms of *carpophora*. A green algae-like substance covered the earth in places and was spattered with pinkish dots. *Cladonia uncialis* was common everywhere though rather stunted at times due to the sandy substratum and the hot summer sun.

Pyxidata barbulata showed pink in the bud and should be in bloom three weeks hence. *Epigea repens* also disclosed swelling buds of potential fragrance. Several plants of *Ilex opaca* were

seen but it is more common near the coast and southward. In a portion of a cedar swamp a few specimens of *Mitchella repens* crept over the sphagnum. It is not found on the barrens proper, but follows the tributaries of the rivers from the coast. *Ilex glabra*, the ink-berry, with evergreen leaves commonly occupied moist ground and the dark berries of this dioecious plant still remained on the bushes.

A small cedar swamp which we investigated sported a clump of Pitcher Plant.

Mosses seen were *Dicranum scoparium*, *Dicranum fuscescens* with leaves curled when dried, *Dicranella heteromalla*, *Thelia hirtella* from the base of a tree, and a species of Bryum.

Pinus rigida was the prevailing conifer. We came across some *Pinus echinata*, the Yellow Pine, with leaves mostly in two's sometimes three's. It has softer and finer needles than the Pitch Pine and the whole tree is less harsh in outline than the stiff branching of *Pinus rigida*.

Where we lunched were some of the grass-like clumps of *Xerophyllum asphodeloides* or Turkey Beard, a plant of the lily family. The dried racemes of last year still stood above the green clumps.

We saw at least a dozen Turkey Buzzards throughout the day soaring overhead as we hiked along. Light reflecting from the under wing surface makes these appear silvery instead of their natural glossy blackish. We also saw a sparrow hawk. Spring peepers were chorusing in several little swampy spots and some of the people had collected frog eggs and a spotted turtle near Maxim, our starting point.

While ambling over some of the sand roads we noticed small three inch piles of sand resembling ant hills. The hole on top was at least one quarter inch wide and a pine needle would fall in to a depth of four inches or so. This excluded the probability of ants and their winding passages. With the aid of a guest's trowel we tried to dig down following the hole, and the leader, after several failures, managed to dig up a species of digger wasp. The ground consisted of a six to eight inch layer of white sand overlying a substratum of brown sand. The workings of the wasps showed some of the latter well attesting to their digging powers.

A single specimen of *Lechea maritima* or Beech Pinweed, a

member of the Cistaceae or Rockrose Family, was discovered with its flat rosette of reddish green, quarter inch, persistent leaves.

Various species of Broom Grasses as *Andropogon scoparius* and *A. virginicus* in dry sandy fields and *A. corymbosus abbreviatus* of swamps were still in a condition for identification. The first two cover more or less completely all abandoned fields in the Barrens before they are taken over by the Pitch Pine-scrub oak growth and line all the sand roads for miles on end.

George F. Dillmann

March 24, 1935—Parker Cabin Mountain, Palisades Interstate Park

Despite the pessimistic predictions of the weather bureau, the day dawned clear and fine. Eleven members and guests turned up for this trip to observe the lichens of the Highlands of the Hudson. Starting at Tuxedo, the party climbed Black Ash and Parker Cabin mountains, observing many common species as they went.

The Brownie's Buttons (*Biatorella clavus*) was especially common on the granite-gneisses of the hills. Only the small black disc of the fruit is visible to the naked eye, the rest of the lichen being hidden within the rock. Rock tripes (*Umbilicaria pustulata* and *Gyrophora dillenii*) were common, especially on the exposed rocks at the higher levels. Less conspicuous were the crustose *Lecidea albocaerulescens* and *Lecanora cinerea*.

At the tops of the hills was a characteristic lichen flora. *Cladonia rangiferina*, the reindeer "moss" was intermixed with *Cladonia uncialis* among the Hairy cap mosses at the edge of the exposed rock surfaces. The former was easily distinguished among the others by its ashy gray color. Here too, especially on the sandstone and quartzite boulders left by the glaciers, was *Rhinodina oreina*, a crustose yellow-green lichen with lobed thallus. Although fairly common at the higher levels in this vicinity, it is only occasionally found at sea level. *Lecanora tartarea*, the "cudbear" which the Scotch use in making a dye, was found fruiting abundantly.

After lunch at the top of Parker Cabin Mountain, and enjoying the extensive view, the beacon tower on High Tor being plainly visible to the east, the party descended to the Hemlock Hill road for water at the brook mentioned by Mr. R. H. Torrey in his Walkbook. Here the find of the day was made, a colony of *Hydrothyria venosa*. This species is found in clear mountain brooks in the Appalachians. It is the only completely aquatic lichen in our flora and as an especial adaptation to resist the rushing waters has veins of tissue on the undersurface. Its apothecia are orange in color and the lichen is olive brown.

While returning through Parker Cabin Hollow, Cladonias were especially noticed. *C. cristatella*, *C. chlorophaea*, *C. verticillata*, *C. coniocraea*, *C. mitrula*, *C. subcariosa* and *C. caespiticia*, all characteristic of the Highlands were found. *Baeomyces roseus* and *Peltigera canina* were also rather common. *Parmelia rudecta* and *P. caperata* were observed on tree trunks; *P. conspersa* on rocks.

Mosses of the Highlands were also observed, among them being *Buxbaumia aphylla* still fruiting abundantly, *Bartramia pomiformis* with the new capsules just formed, *Weberi sessilis*, *Hedwigia albicans*, *Grimmia apocarpa*, *Thelia hirtella*, *Dicranum scoparium*, *Dicranella heteromalla*, *Catharinea undulata*, *Leucobryum glaucum*, *Funaria hygrometrica*, *Climacium americanum*, and *Polytrichum commune* and *piliferum*.

The catkin bearing shrubs had already begun to flower, alder and beaked hazelnut having their staminate catkins fully expanded. The party examined the delicate pistillate flowers of the hazelnut and remarked upon their beauty.

The herpetologists too were not neglected; besides collecting wood frogs and their eggs and water newts in the ponds along the trail, a racer blacksnake was found in Parker Cabin Hollow. The reptile was still sluggish after its long winter hibernation and submitted to capture without much show of resentment.

John W. Thomson, Jr.

PROCEEDINGS OF THE CLUB

Meeting of January 8, 1935

The meeting was called to order at the Men's Faculty Club of Columbia University at 7:45 P. M. after an informal dinner. There were forty-eight present.

Minutes of the meetings of November 21, December 4 and 18 were read and approved.

The following were unanimously elected to membership in the Club: Dr. C. W. Argue, Dept. of Biology, Univ. of New Brunswick, Fredericton, N. B. Canada; Prof. James P. Bennett, 110 Hilgard Hall, Univ. of Cal., Berkeley, Cal.; Mr. D. S. Carpenter, Middletown Springs, Vt.; Miss Mary Jo. Cobb, Apt. 407, 111-7th Street, Garden City, L. I., N. Y.; Dr. Grant D. Darker, Farlow Reference Library & Herbarium of Cryptogamic Botany, 20 Divinity Ave., Cambridge, Mass.; Mr. Sidney K. Eastwood, 301 South Winebiddle Ave., Pittsburgh, Pa.; Addriance S. Foster, Dept. of Botany, Univ. of Cal., Berkeley, Cal.; Miss Edith E. Glatfelter, 4720 N. 20th Street, St. Louis, Mo.; Mr. Reimhardt Heger, Jr., 107 Elliott Place, Brooklyn, N. Y.; Frederick J. Hermann, Bot. Gardens, Univ. of Mich., Ann Arbor, Mich.; Dr. H. D. House, N. Y. State Museum, Albany, N. Y.; Mr. Chas. F. Irish, 418 East 105th St., Cleveland, Ohio; David D. Keck, Carnegie Inst., Stanford Univ., Cal.; Rev. Anselm M. Keefe, St. Norbert College, West De-Pere, Wis.; Père Louis M. Lalonde, La Trappe, P. Q., Canada; David H. Linder, Farlow Reference Library & Herbarium of Cryptogamic Botany, 20 Divinity Ave., Cambridge, Mass.; Miss Bessie G. Nelkin, 440 East 26 St., New York, N. Y.; Mr. Ira G. Otis, 4320 First Ave., N. E., Seattle, Wash.; Miss Libra Palmeri, 313 17 St., Brooklyn, N. Y.; Mrs. Helen S. Probst, 12 N. 72 Street, New York, N. Y.; Mr. Robert Runyon, 812 St. Charles St., Brownsville, Texas; Mr. Alexander H. Smith, 1236 Prospect St., Ann Arbor, Mich.; Omer E. Sperry, Bot. Dept., Univ. of Nebr., Lincoln, Nebr.; Oran B. Stanley, Colgate Univ., Hamilton, N. Y.; Prof. Lewis H. Tiffany, Dept. of Botany, Ohio State Univ., Columbus, Ohio; R. E. Woodson, Jr., Mo. Botanical Garden, St. Louis, Mo.

The following resignations were accepted with regret: Mr. Chas. B. Atwell, San Francisco, Cal.; J. Franklin Collins, Providence, R. I.; Miss Grace A. Stone, New York, N. Y.

Mrs. R. A. Harper was commended for her activities in getting so many new members.

Dr. A. F. Blakeslee gave a humorous address entitled "Before and After Retiring" in which he asserted that the first botanical society was in the Garden of Eden. He continued to tell about the developments of botany and botanical viewpoints and predicted that the changes in the next century would be as great as the past one. He closed with the recommendation that this annual dinner be made a regular function to which all botanists of New York City might be asked.

Dr. Hazen then called for reports of the officers and committees. Reports of the Secretary, Treasurer, Editor, Editor of TORREYA, Business Manager, Delegate to the Council of the New York Academy, Delegate to the Council for the American Association for the Advancement of Sciences, Chairman of Field Committee, and Entertainment Committee were read and approved.

The Secretary read the report of the Council Meeting of January 4.

Dr. Oliver A. Farwell was elected to Honorary Life Membership in the Club.

The matter of field membership as proposed by the Council was discussed and it was moved to establish a field membership with annual dues of two dollars, with the further provision that with an additional payment of three dollars any field member may, if elected, become a member. This was unanimously carried.

The President then took up the matter of election of officers for the coming year. The nominations as proposed by the Council were read by the Secretary. Dr. Hazen was duly elected President by vote of the Club.

The officers elected for the coming year are given on the inside of the front cover of Torreya.

It was moved by Mr. Torrey and seconded by Dr. Harper that a letter be sent to the state legislature urging support of the Bear Mountain Trail project. Dr. Harper also moved and it was duly approved that the matter of enlarging Bear Mountain Park as proposed by Mr. Torrey be referred to the Council for further consideration. Mr. Torrey was asked to keep the Council informed of developments in this matter.

FORMAN T. MCLEAN
Secretary

Meeting of January 16, 1935

The meeting was called to order at Columbia University at 3:30 p.m. by President Hazen. There were 43 present.

The following people were unanimously elected to membership in the Club: Mr. E. J. Alexander, New York Botanical Garden, New York; Mr. A. S. Goodale, Amherst, Massachusetts; Dr. Th. Just, University of Notre Dame, Indiana; Mr. A. H. Norton, 22 Elm Street, Portland, Maine; Miss Florence T. Simonds, University of Maryland, College Park, Maryland; Mr. D. Smiley, Lake Mohonk, Ulster County, New York; Miss Alma Stokey, South Hadley, Massachusetts; Mr. J. M. Winter, Peru, Nebraska; and Mr. J. S. Ames.

Professor G. Funke of the University of Ghent gave an interesting illustrated talk on the "Observations on the Growth of Water Plants."

Forman T. McLean
Secretary

Meeting of February 5, 1935

The meeting was called to order at the American Museum of Natural History at 8:15 p.m. by President Hazen. There were 39 present.

Dr. Willard M. Porterfield of Columbia University gave an interesting illustrated talk on "Bamboos of Eastern Asia."

Forman T. McLean
Secretary

NEWS NOTES

Dr. Williard M. Porterfield, whose article on "Two hardy bamboos of East China," appears in this issue, went to China as instructor in botany at St. Johns University, Shanghai, in 1916. From 1922 till he resigned to return home in 1933, he was professor of biology and head of the biology department of the University. While in China he made a special study of bamboos, publishing numerous papers on them. He also made a general survey of bamboo and its uses in China for the Government Bureau of Economic Information.

At the International Flower Show held in New York in March, the Brooklyn Botanic Garden received a medal for an exhibit showing "Garden Operations." The exhibit included the preparation of soil, the planting of seeds, the transplanting of seedlings, and many other features of gardening. Two types of hot beds were also shown, the old, manure-heated form and a new, electrically heated one. In connection with the exhibit a special leaflet on gardening processes was published and distributed.

At the Flower Show the New York Botanical Garden had an exhibit of South African plants arranged in an informal manner suited to a border in the south or southwest. Among the plants were some cultivated ones such as freesias and calla lilies represented by garden varieties, others, as Watsonia and Tritonia, represented by the wild forms. There were many succulents,—Aloes, Euphorbias, Senecios, Staphelias and many forms of the curious stone plants—Lithops, Conophytum and other genera closely related to Mesembryanthemum, of which several species were shown. One of the Cycads, Stangeria, was shown in fruit. The exhibit was awarded a special gold medal by the International Flower Show and a gold medal by the Garden Club of America.

Dr. Harold St. John, professor of botany at the University of Hawaii, has been elected a corresponding member of the Czechoslavakian Botanical Society. (Science)

The Allegany School of Natural History has announced details for its ninth session at Allegany State Park, July 5 to 24. Dr. Robert E. Coker of the University of North Carolina is the director as in other years. The course in field botany will be given by Dr. Robert B. Gorden of Ohio State University. There will also be courses in field zoology, field geology, natural history of birds, and nature study.

Dr. E. D. Merrill, Director of the New York Botanical Garden, and Dr. A. B. Stout, Director of the laboratories of the Garden, have been elected honorary fellows of the British Royal Horticultural Society.

Dr. Benjamin L. Robinson, who for forty-three years has been curator of the Gray Herbarium of Harvard University, and for thirty-five years professor of systematic botany, has resigned and been appointed, as of September 1, professor and curator emeritus.

THE TORREY BOTANICAL CLUB

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OF THE

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The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

(3) Index to American Botanical Literature, reprinted monthly on cards, and furnished to subscribers at three cents a card.

Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.

Volume 35 May–June, 1935 No. 3

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BY
GEORGE T. HASTINGS

John Torrey, 1796-1873

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THE TORREY BOTANICAL CLUB

OFFICERS FOR 1935

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Matter for publication, and books and papers for review, should be addressed to

GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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A study of a Pre-Kansan peat deposit

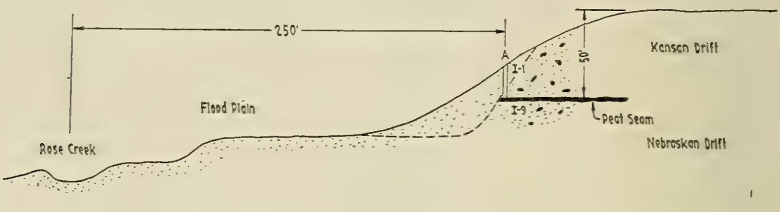
Etlar L. Nielsen

Authentic early studies of American preglacial and interglacial deposits, although not numerous, have been known for a considerable time. In 1870 Orton (4) described an extensive bed in southwestern Ohio. In 1878 McGee (3) reported the presence of similar deposits in northeastern Iowa. The latter were referred to as the "forest bed" and they were later correlated with Aftonian gumbotil. In the geological report of March 10, 1882, Winchell (5) cited buried deposits in southeastern Minnesota, particularly in Mower and Fillmore Counties.

The considerable interest in postglacial peat manifested by numerous studies in recent years has suggested the desirability of focusing attention upon some of the much older deposits. Accordingly, the stations cited by Winchell as occurring on the farm of "Mr. Thomas Smith, S.E. $\frac{1}{4}$ Sec. 12, Windom twp.," Mower County were revisited for detailed study. The first of these, of the Aftonian or the first interglacial period, is located in a pasture about one fourth mile south of the present Smith dwellings. The peat was originally reported as exposed in the banks of Rose Creek, but at present wash from the adjacent fields under cultivation has cut down the bevel of the ledge and this, together with the humus from the forest, has built up a talus that now buries the seam of peat to a depth of about 6 feet. Upon removal of part of this talus a fresh section was exposed along what was evidently the former ledge. Nine samples were taken at designated intervals. A diagrammatic representation of the outcrop (Station 1) is shown in the following sketch.

The samples for the study were taken from the shaft sunken at A and will be referred to under the following designations: I-1 from the surface; I-2 at 1 foot; I-3 at 3 feet below the sur-

face; I-4 from the rock flour immediately above the peat; I-5, I-6, I-7, and I-8 spaced at intervals of 5 inches through the seam; and I-9 from the Nebraskan drift.



Section showing location of interglacial peat deposit.

The Kansan drift, I-1 to I-3 inclusive, appeared much like the rock flour below except that there were a number of grit fragments and pebbles present in the former. Directly above the peat was a bed (I-4) of very fine rock flour showing what was interpreted in the field as varves. The peat seam, I-5 to I-8 inclusive, a deposit 20 inches in thickness, appeared to be richest in organic matter near the middle. Pieces of this peat are readily broken along the contact line of the thin laminations. Sample I-9, the Nebraskan drift, is a well-weathered, sticky, dark gray-black earth, with a few pebbles showing considerable disintegration.

A laboratory study of the deposit was made to determine the physical nature of the environment and the organic matter present.

To retrieve any plant fragments in the samples it was necessary to loosen the particles of soil from one another. This was accomplished by adding distilled water in excess, then gently stirring and mashing the resulting mixture with the fingers. After the wood fragments were removed, the mixture was evaporated to dryness in an oven. The dried lumps were crushed between the fingers and later screened, using the Tyler Standard Screens for the analysis.

High percentage of clay and silt is characteristic throughout the series but especially through the peat and the member directly above. Sample I-9 shows a silt and clay content of 79.61% which is in accord with analysis made by Kay and Apfel (2) for Nebraskan drift. It is also noteworthy that there are no rock fragments greater than 1.96 mm. which may partially be accounted for by the very thorough weathering of the

original drift surface. Samples I-4 to I-8 inclusive show percentages of clay and silt ranging from 91.% to 96.13% and, together with the laminated nature of the deposit, seems to indicate a proglacial lake of early Kansan time. The extent of such a body is not known at present.

An examination of the analysis of the Kansan drift of the overlying extramorainic till plain shows a mixture of greater size range. The largest of the few grit and pebble fragments are smaller than 15.85 mm. and the bulk of the material is medium sand, fine sand, clay, and silt.

The percentage of volatile matter was found to be approximately 10%.

Following the pioneer work of Orton, McGee, and Winchell, there were a number of studies of buried peat deposits in Iowa. Various workers speak of pieces of cedar and tamarack wood, several mosses, and occasional angiosperms being found in wells, road cuts, and similar excavations.

More recent work, such as that of Sears, Lane, Wilson, and Voss of this country and Erdtman of Sweden, has stimulated further study of these deposits, especially of the pollen which they contain.

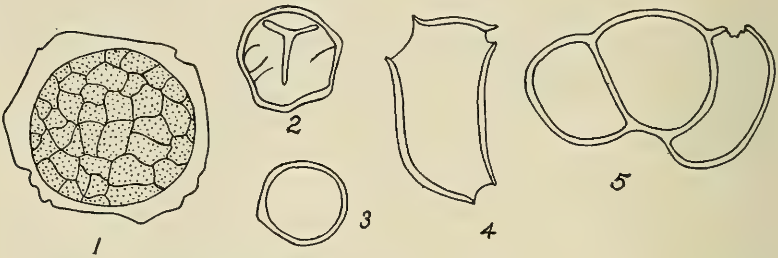
Small chips of wood were found throughout the sediment described above. These are in a remarkably good state of preservation. They were embedded in celloidin, sectioned, stained with Delafield's hematoxylin, destained with acid alcohol, and mounted in balsam. An examination of some 40 slides showed a predominance of spruce and tamarack. Several moss fragments were found, none of which was in an identifiable condition.

Pollen analysis was patterned after the method recently suggested by Erdtman (1) except that the second treatment with sodium chlorate and sulfuric acid was eliminated. Samples of the residue obtained were mounted in Erdtman's lactophenol solution. No statistical analysis has been attempted to date.

Pollen from the following has been identified: *Picea* sp., *Abies balsamea*, *Pinus* sp., Betulaceae (perhaps *Corylus*), *Acer rubrum*, *Lycopodium complanatum*, *Lycopodium lucidulum*, *Juglans* or *Carya*, *Juniperus* or *Larix*, *Prunus*?

In addition to the pollen, several fragments of grasses and sedges and a few trichomes were observed.

From the foregoing facts, one may conclude that a seam of peat was laid down in a swamp during Aftonian or early Kansan time. As the ice sheet approached, a glacial lake formed in which



Camera lucida drawings of spores:—(1) *Juglans* or *Carya*—58μ; (2) *Lycopodium lucidulum*—32μ; (3) *Juniperus* or *Larix*—26μ; (4) Betulaceae (perhaps *Corylus*)—49μ (somewhat distorted); (5) *Picea*—71μ.

varved clays were deposited over the peat. A critical study of the plant remains shows that a northern coniferous plant cover was present in southeastern Minnesota during the Aftonian interglacial or the early Kansan glacial period.

University of Minnesota
Minneapolis, Minn.

Literature Cited

(1) Erdtman, G. and Erdtman, H.
The improvement of pollen-analysis technique.
Svensk Botanisk Tidskrift. 1933. Bd 27. H. 3.

(2) Kay, G. F. and Apfel, Earl T.
The Pre-Illinoian Pleistocene geology of Iowa.
I. G. S. Vol. 34. 1928. pp. 1–305.

(3) McGee, W. J.
On the relative positions of the forest bed and associated drift formation in northeastern Iowa.
Am. J. Sc. (3) 15. 1878. pp. 339–341.

(4) Orton, Edward
On the occurrence of a peat bed beneath deposits of drift in southwestern Ohio.
Am. J. Sc. Vol. 50. 1870. pp. 54–57.

(5) Winchell, N. H.
Geological and natural history survey of Minnesota. "Geology of Mower County." Vol. 1. 1882. pp. 347–366.

A late record for "frost flowers"

L. M. DICKERSON

One can but wonder why the ice crystals or "frost flowers" which form on dried plant stems have so long escaped careful laboratory study unless it is because of the unusual conditions of temperature with which they are identified. It is hoped that the following observations may be of interest to research workers and may suggest possible utilization of this phenomenon to advance our knowledge of plant anatomy and physiology.

My first observations of "frost flowers" were made on Nov. 13, 1934. Several plants were found on the western border of the Cumberland University campus around the stems of which large, symmetrical rosettes of ice crystals had formed. The similarity of these ice ribbons to hoar frost attracted my attention. They were formed on an area beginning about 10 cm. above the surface of the ground and extending up the stem about 6 cm. to 8 cm. The rosettes were from 4 cm. to 12 cm. in diameter. In general the largest rosettes were on the stems with the greatest diameter.

The plants on which the crystals occurred had shed all seed and leaves and an exact identification could not be made. All were compositae and, I think, of the genus *Pluchea*. They were under a sparse growth of oak on a gentle slope facing East and slightly protected from westerly and south-westerly winds. At this time the ground was not frozen under the trees and clumps of grass nearby were still green. The bases of the plants were covered by recently fallen leaves.

"Frost flowers" were again observed on this group of plants on Jan. 3, 1935 and I have found no other record of their occurrence so late in the season in this latitude. During the previous night the temperature had dropped rapidly and steadily with only a slow atmospheric drift to the eastward. Hoar frost had formed abundantly in open fields and persisted until after 10:00 o'clock, A.M. Ice about 4 mm. thick had formed on water in shallow depressions. Examination showed the dried stems to be split radially and in some cases to be broken at the level where crystals had formed previously. Below this region, however,

typical "frost flowers" had formed. These were smaller than those observed in November, measuring only 3 cm. to 7 cm. in diameter. All had formed close to the ground; in most cases beginning about 1 cm. above the soil line and extending about 5 cm. up the stem. Many of them had pushed up under or through a mulch of fallen leaves around the base of the stems.

Crystals were observed again on these plants on Jan. 29, 1935. They were small but typical "frost flowers" and were formed beneath the snow! The snow crust was carefully removed from around the plants and a piece of black mulch paper placed behind and beneath the crystals as a contrasting background. The mulch paper was left in place all day and as the sun shone brightly the snow was entirely melted away from the area within 15 cm. of the plants. The crystals melted entirely away from the stems, also. During the night of Jan. 30, typical ice masses 2.5 cm. and 3.5 cm. in diameter formed around the stems. These ice masses were quite symmetrical, whereas those formed under the snow were deformed by pressure against the leaves and snow above them. The ice masses on the stems surrounded by paper were not appreciably larger than those formed on other stems nearby. These ice masses had disappeared by 4:00 P.M. Crystals formed again during the night and, when observed about 9:30 A.M. the following morning, the rosettes were about 1.5cm, in diameter. Atmospheric temperature at the time was about 4° C. and the ice was beginning to melt. At 11:00 o'clock P.M. the night before, the atmospheric temperature (measured about 8 feet above the surface of the ground) was 0° C.

During the interval between my first and second observations Dr. R. M. Harper sent me a reprint—from Torreya 31; 17, Aug., 1931—of his article recording observations of "frost flowers" in Florida. This reprint also contained an article by Mr. H. M. Jennison suggesting an explanation of the mechanics of this phenomenon which he had studied in the vicinity of Knoxville, Tenn. My own observations agree with those of Mr. Jennison so closely that no detailed description of the ice masses need be recorded here. Attempts to cut off stems and photograph the under surface of the ice masses were unsuccessful, the crystals shattering off at the edge of the bark. Immediate examination with a hand lens showed radial plates of ice in the stem. These plates were thicker in the middle than at the edges

of the ribbon and were of clear, transparent ice. The ribbons, themselves, were translucent; a difference which may be due in part to the minute corrugations noted by Mr. Jennison. Small gas bubbles were noticeable in the ice also. Another interesting fact is that where the stems were cut they were still firm and woody. The inner bark was green and appeared to be in a living condition; a circumstance which lends support to the assumption—by Mr. Jennison—that the roots are still active.

It is interesting to note that successive crops of crystals may form on one stem although they retreat toward the base as the stem is split by the ice plates. Their formation under the fallen leaves also confirms the previous assertion that the water is crystallized before it is forced from the stem. It is probable that such formations occur often under cover and are not noticed.

These "frost flowers" suggest a number of interesting problems. If they can be reproduced under controlled laboratory or field conditions, careful study of them may lead to more exact determinations of critical temperatures, root pressures in dormant plants and other physiological and anatomical factors which determine the frost resistance of hardy species. Careful analysis of the gas bubbles enclosed in this ice and of the ice as well may tell us something of the rate of and conditions attending respiration in the roots of dormant plants.

LEBANON, TENN.

Cuscuta americana in Florida

T. G. Yuncker

Cuscuta americana L. is the common dodder found throughout the West Indies and to a somewhat lesser extent in Mexico, Central America and South America. It occurs on a great variety of hosts but seems to prefer those which are woody in character. So far as I have been able to discover, however, this dodder has been unknown in the United States until comparatively recently. In March 1925, L. H. Bailey and Ethel Zoe Bailey (No. 6457) collected a specimen growing on *Sida* at Coconut Grove near Miami. Charles A. Mosier collected a specimen on *Coccoloba* at Buena Vista, Miami, in December 1929, and a second specimen at Pinelands, Buena Vista, Miami, in January 1930. H. N. Moldenke also collected a specimen (No. 372a) "climbing over low shrubs" at Buena Vista in January 1930. These are the only specimens of this species of which I have any record as having been taken in the United States.

There does not seem to be any obvious reason why *C. americana* did not enter Florida long ago. There are many regions in the State where it would appear that conditions for its development are ideal and now that it has gained a foothold it is quite possible that it may eventually become a prominent member of the flora of the State.

Seven other species of Cuscuta are known to occur in Florida viz: *C. exaltata* Englm., *C. umbellata* H.B.K., *C. obtusiflora* variety *glandulosa* Englm., *C. pentagona* Englm., *C. indecora* Choisy, *C. Gronovii* Willd., and *C. compacta* Juss. Of these species *C. exaltata*, which is more common westward, is rare, only one specimen having been seen from Florida.

DePauw University
Greencastle, Ind.

Actinea herbacea

JOHN VOSS

From a phytogeographical standpoint, the sand barrens of central Illinois extending from Pekin to Meredosia on the eastern side of the Illinois river have long been a center of botanical interest. Carl Geyer (1) visited the locality almost one hundred

Actinea herbacea near Manito, Ill.

years ago and collected *Trautvetteria palmata* Fisch & Mey which since has never been reported elsewhere in the state. Later Gleason (2) found many western species including *Cristatella Jamesii* T. & G. and *Lesquerella spathulata* Rydb. The

latter were never reported east of central Nebraska prior to Gleason's work.

In the spring of 1934 the writer visited a section of the sandy bluff overlooking the Illinois valley six miles north of the city of Manito. Associated with plants such as *Opuntia Rafinesquii*, *Phlox bifida* and others of the bunch-grass association, there were found many specimens of *Actinea herbacea* (Greene) Robinson. Hitherto, *Actinea herbacea* has only been found at Joliet, Illinois, and in Ottawa County, Ohio. Cowles (3) considered it a relative of *A. acaulis*, a pioneer xerophyte in the Rocky Mountain region which probably migrated eastward during a dry postglacial period.

The origin of the sand in this locality can be traced back to early postglacial times when the Kankakee Torrent (4) was at its height. The flood waters carried large quantities of outwash material in the form of sand and gravel and deposited it in the Illinois valley south of the Bloomington moraine. This was followed by a migration of plants from several directions, some remaining permanently in the sand barrens while others disappeared due to changes in environmental conditions. Whether *Actinea herbacea* is a survivor of early postglacial times or whether it is a newcomer in this locality, is difficult to say. Since the area in which it was found was not large, it could easily have been overlooked by former investigators. Perhaps it is found in other localities and the accompanying photograph may be of service to other workers in the identification of the plant.

Manual Training High School
Peoria, Illinois

Bibliography

(1) McDonald, F. E., A Sand Dune Flora of Central Illinois. Plant World **3**: 101–103. 1900.

(2) Gleason, H. A., A Botanical Survey of the Illinois River Valley Sand Region. Bull. Illinois State Lab. Nat. History **7**: 149–194. 1907.

(3) Cowles, H. C., The Succession Point of View in Floristics. Proc. International Congress of Plant Sciences Ithaca. **1**: 687–691. 1926.

(4) Ekblaw, G. E., and Athy, L. F., Glacial Kankakee Torrent in Northeastern Illinois. Bull. Geol. Soc. America **36**: 417–428. 1925.

A new station for Trillium Ludovicianum

Erdman West

During January 1934, Dr. W. A. Murrill was informed that there was a peculiar plant growing in the woods on a farm near Gainesville, Florida. A day or two later, Doctor Murrill and the writer visited the farm to examine this unusual plant, and were surprised to have our guide lead us to a clump of trilliums. A survey of the neighborhood revealed several hundred other

Trillium Ludovicianum Harbison. Left—specimen with dark petals and narrow sepals. Right—specimen with light petals and broad, mottled sepals.

specimens. Trilliums, including this species, are not uncommon in Florida from Tallahassee westward, and one or two stations are known about 30 miles east of that area. As the crow flies, Gainesville is 50 miles south and over 100 miles east of Tallahassee. As far as known, there are no records of any trilliums in or near this new area.

The station covers about an acre of hillside sloping to the west and consists of moist but well-drained, open woodland.

The woody vegetation includes scattered loblolly pines, several species of oaks and a great many shrubby species, forming a dense undergrowth. There is no evidence that fire has ravaged this area for many years. although the surrounding territory is burned almost annually. Considerable scouting in the vicinity has not yielded any further colonies. The first open flower at this station in 1935 was observed on January 8.

The plants correspond very well to the description of *Trillium Ludovicianum* Harbison, as given in Small's "Manual of the Southeastern Flora," and also to Harbison's original description in the Biltmore Botanical Studies. They show considerable variation in petal color. About half of those observed have purplish-chocolate bases or are streaked with these colors. The age of the blossom does not seem to have any bearing on these color variations. The sepals also exhibit variations in shape and markings. Some are lanceolate and solid green, while equally as many are lanceolate to ovate-lanceolate, and mottled like the leaves. One plant has the sepals colored purplish like the petals. No correlation whatsoever has been observed between the various forms and colors of petals and sepals. Some of the leaves are acuminate at the tips, but most of them are acute or blunt. The figure shows both light and dark colored petals and the variations in the sepals.

FLORIDA AGRICULTURAL EXPERIMENT STATION
GAINESVILLE, FLORIDA

An extension of the known range of the Mexican bald cypress

Ira L. Wiggins

During February and March of 1933 I had the privilege of accompanying Dr. Forrest Shreve and Dr. T. D. Mallery of the Carnegie Institution's Tucson Desert Laboratory on a field trip into Sonora, Mexico. Near the southern limit of our exploration we enquired about the character of the country east of the delta region of the Rio Yaqui, and Mr. Huffacker, an automobile dealer at Obregon (formerly called Cajeme) told us that there were a number of interesting trees and shrubs growing in the low hills a few miles to the east and suggested that we swing around the loop formed by the road which ran from Obregon through Tesapaco, Cedros, and Queriego, thence back to Obregon.

We reached Cedros during the forenoon of March 5th and there found a colony of about a dozen trees of *Taxodium mucronatum* Tenore. The trees grew among granite boulders and on the exposed country rock along the banks of the Rio Cedros. The larger specimens were about one and a half meters in diameter and from twenty to thirty meters high. The trunks were straight, showed only slight buttresses at the bases, and began to branch at distances varying from two to ten meters from the ground. Most of them seemed to be healthy and thriving, but no seedlings or trees under fifteen meters height were observed.

Mexicans living in the village said that the trees were more abundant and attained greater size farther up the stream in the mountains toward the east. They did not know, however, whether or not the tree occurred in Chihuahua. A second, smaller colony was seen along the banks of the Rio Cedros about four kilometers farther down the stream where we crossed it on our way to Queriego. These individuals looked less healthy than those at Cedros and were very much smaller and less symetrical.

Standley (1920) reported that the range of *Taxodium mucronatum* extended from Sinaloa to Coahuila and southward into Guatemala. Pilger (1926) stated that the trees grew between 1400 and 2300 meters altitude in the Mexican tableland,

and both mentioned that they grew chiefly in wet soil. Cedros is over 100 kilometers north of the Sinaloa-Sonora line (about Long. 109° 20′ W., Lat. 27° 40′ N.), at an altitude of about 800 meters, and is situated in a small valley that supports a flora containing a large percentage of Lower Sonoran, desert species. Thus the Cedros station is of considerable interest from three points of view; it is the first station reported for the genus in the state of Sonora, it is at an elevation about 600 meters below that at which the species usually thrives, and it is well out in the desert area, connected with the higher, moister, mountainous regions by the narrow ribbon of the stream.

There are slightly differing reports as to whether the leaves of *T. mucronatum* are deciduous or persistent. Rheder (1927) writes, "Also the Mexican *Taxodium mucronatum* (*T. distichum* var. *m.* Henry) with persistent lvs. is not hardy, but is occasionally planted in Calif." Pilger (1926) says, " . . . die Kurzzweige mit gescheitelten Blättern werden erst im zweiten Jahre abgeworfen; . . . " and Koch (1873) writes, " . . . Zweige im Vaterlande in der Regel nicht abfallend; . . . " but Standley (1920) describes the tree as having " . . . leaves (and many of the young branches) deciduous, . . . ". Bentham and Hooker (1880) in their characterization of the genus, say that the leaves are "deciduous or sub-persistent."

Probably Bentham and Hooker's term "sub-persistent" is a happier one than "persistent" in describing the leaves and young branchlets of *T. mucronatum*. Pilger's statement implies that the old leaves may be pushed from the branchlets by the new growth as it comes out during the second year, and Koch's that the trees normally have some foliage on them throughout the year.

At the time the collection (Wiggins 6431) was made at Cedros it was not possible to tell how much of the foliage had persisted through the winter months, for the new growth was already well advanced and practically no leaves from the previous season were still on the trees. However, it was quite obvious that the previous year's growth did not persist *through* the growing season of the second year. In a half dozen herbarium sheets there was only one small branchlet to which an old leaf remained attached.

A few mature cones were still on the tree, but the scales fell

apart at a touch so none of them could be preserved intact. The young ovulate cones were from 8 to 12 mm. in length. The male cones had not yet begun to shed pollen and were only 2 or 3 mm. long.

STANFORD UNIVERSITY, CALIFORNIA

Literature Cited

Bentham, G. and J. D. Hooker, Genera Plantarum **3**[1]: 429. 1880.

Koch, Karl. Dendrologie **2**[2]: 198. 1873.

Pilger, R. Gymnospermae, in Engler, A. and K. Prantl, Die Naturliche Pflanzenfamilien **13**: 355. 1926.

Rheder, Alfred. Manual of Cultivated Trees & Shrubs Hardy in North America 25. 1927.

Standley, Paul C. Trees and Shrubs of Mexico, Contr. U. S. Nat. Herb. **23**[1]: 60. 1920.

BOOK REVIEWS

Plants of the Vicinity of New York[1]

This long awaited publication by Dr. Gleason was planned to enable the person who knows nothing whatever of botany to determine in a few minutes' time the name of any flowering plant or fern growing wild in the vicinity of New York. Except for a few rare species, it will serve well for all the region within two hundred miles of New York.

It has long been felt that the treatments of flowering plants given in current manuals are far too difficult for the beginner. Here, then, is a book which entirely avoids such pitfalls as the number of cells in the ovary, or the attachment of ovules—characters which are stumbling blocks even for the professional botanist whenever material not in the best of condition is offered for identification. This compact and neat book of 284 pages, fitting readily into the pocket, succeeds admirably in its purpose, and it is a surprise and a delight to see people who have never even heard of a pistil or a stamen, after a few minutes' reading of the introductory paragraphs, go ahead and identify accurately the specimen at hand.

The first part of the publication consists of an introduction to the structure of plants, taking up in a very simple manner the leaf, its arrangement on the stem, and its variation from simple to compound forms. A brief discussion of shapes of leaves follows, the principal forms and necessary details being lucidly shown by drawings. The parts of a typical flower and the kinds of inflorescence are likewise briefly described and illustrated. In all, nineteen items are treated in these fourteen pages of introduction, including two paragraphs on "names of plants." The introduction is followed by a simple glossary (a little less than three pages) which is characterized by such fresh and vivid elucidations as "Ellipsoid. Shaped like a football." "Obovoid. Shaped like an egg upside down." "Stolon. A leafy basal horizontal stem which eventually takes root and becomes an independent plant."

[1] Gleason, H. A. Plants of the Vicinity of New York. lxxxvi+198 pages. New York Botanical Garden, 1935. Price $1.65.

Except for a general index, the rest of the book consists of keys to the plants of the New York region, with three pages of introduction on "How to Use the Book."

In the preliminary key to the groups—the arrangement surprisingly resembles that of the Medieval botanists who had eyes only and no microscopes—we have six groups as follows: woody plants, vines, aquatic plants, ferns and their allies, herbaceous monocotyledons, herbaceous dicotyledons, and unusual plants. The group of "unusual plants" includes such oddities as cactus, Indian pipe, horsetails, *Lobelia Dortmanna*, *Hudsonia*, asparagus, etc. These leading groups key directly into the single systematic treatment of families, genera, and species which forms the backbone of the book, and to which all paths lead. Here again we have clear line drawings of diagnostic features in groups which would otherwise remain beyond the comprehension of the beginner, despite any key written in words.

It is a relief to find common names that are actually in use. In the absence of an established common name, the general name of the group is employed for each individual species, thus we find that there are fourteen species of "Bedstraw," twenty-seven "Violets," and the species of many other genera are in similar large proportions. The fact that the common name can be reached in practically all cases without the need of consulting the scientific name will endear this little volume to many of the "thousands of Boy Scouts, hikers, campers, tourists, and gardeners" for which it was planned. The inclusion of *all* species growing wild in the New York area except for a few technical groups is sufficient indication that the work is not of a superficial character. No single botanist has ever found *all* the plants mentioned. The reviewer, in going over the book, discovered that there was a total of 255 species which he had never seen growing wild in the New York area, and of this number 140 have never been seen or collected by him anywhere in northeastern United States or Canada. The large majority of these are casual waifs found now and then in cultivated fields or escaped from gardens, but there are some, such as *Obolaria*, *Aplectrum hyemale*, *Cypripedium candidum*, and *Pogonia divaricata*, which are of great rarity, and have been seen by very few botanists.

There are a few plants growing in the New York area that

one feels might have been included, such as the different varieties of the spinulose shield fern which often have the appearance of distinct species, the purple cliff brake (*Pellaea atropurpurea*), *Lycopodium annotinum*, *Oakesia puberula*, *Betula papyrifera*, *Ranunculus fascicularis*, *Hepatica acutiloba*, *Dicentra canadensis* and *Viola latiuscula;* also the weedy introductions, *Linaria minor*, *Chenopodium Botrys*, and *Cycloloma atriplicifolium* which are not infrequent in the vicinity of New York.

This little volume should do much to arouse the interest of the general public as well as the botanical student in our native plants and in systematic botany. A highly successful future for it is predicted.

H. K. Svenson

Brooklyn Botanic Garden

Plants of Southern California[2]

In his Manual of Southern California Botany, Dr. Munz has rendered a distinct service to all botanists interested in the plants of the region. The area covered is roughly the southern one-fourth of the state, the northern boundary running through Ventura, Kern and Inyo counties, including all of Death Valley, the other boundaries being those of the state. For this region all of the ferns and flowering plants are described and many are illustrated with line drawings. Keys to families, genera and species are complete. Covering a restricted region, the keys are simpler and shorter and localities are listed in more detail than is possible in a work covering the entire state. Comparing the volume with Jepson's Manual of the Plants of California it is noted that for many of the larger genera less than half as many species are included. Thus 31 species of Lupinus are given for Southern California, 65 for the state; for Trifolium the numbers are 16 and 41; for Brodiaea, 8 and 21; for Potentilla, 20 and 44; for Calochortus, 16 and 24; and for Carex, 41 and 126. As the region covered covers the desert regions of the state all of the species of *Cactaceae*, *Yucca*, *Agave* and most of the succulents are included. In the *Crassulaceae* there is noted a feature in which both of the manuals migh have been improved —the use of synonyms. Jepson describes eight species of

[2] Philip A. Munz. A Manual of Southern California Botany. (8) xxxix +642 pages. Claremont College, 1935. $5.00.

Cotyledon, Munz fourteen of *Echeveria*, but there is nothing in either book, except the similarity of specific names, to indicate that the two genera are the same. Incidentally, and characteristic of the two manuals, Jepson gives common names to several of these species, Munz a common name for the genus only.

The Introductory "Discussion of Distribution of Southern California Plants" of some thirty pages describes very briefly the geological and physiographical features of the region, the life zones and the distinctive floras. Of the last there are described the Mohave Desert, Colorado Desert, Montane, Cismontane and Insular Floras. For each of these there is a list of characteristic plants and of those endemic.

At the end of the book, before the glossary and index, are a number of pages of Nomenclatorial Changes, listing species and varieties the names of which have been changed by the author. In this section nine varieties and two species are described for the first time as new, with their Latin diagnoses. Another unusual feature is a list, with brief biographical notes, of people for whom species have been named. Another list is of specific names with their derivations.

The book is attractive in appearance, the descriptions are clear and complete and the keys easy to follow.

George T. Hastings

FIELD TRIPS OF THE CLUB

Trip of April 7

Fifteen members and guests assembled at Point Pleasant and in a procession of four cars advanced to the Pine Barrens, south of Warren Grove.

We found *Corema* in perfection, arbutus and *Pyxidanthera* were just coming into bloom. *Dendrium* was abundant, but not in bloom. A few flowers of *Leucothoe* were found.

We visited a cranberry bog which was just being made and had an explanation of how bogs are made and cared for.

Orontium was beginning to show its gold.

Vernon L. Frazee

Trip of May 5

Twenty members and guests met for bird study at Van Cortlandt Park where the swamp provides an attractive environment for water birds and those preferring dense shrubbery, while the hillsides to the west of the Saw Mill River Parkway are more favorable for warblers and other woods' birds.

Although it was cold, with a temperature of 50° at the time of starting, and a slight wind made observations more difficult, yet forty-five species were observed between 10 A. M. and 3 P. M. when, as we neared Dunwoodie, a shower sent the birds and us to cover.

Several interesting records were made; a black duck sitting on her nest in the swamp; a green heron; and two male black-crowned night herons with their white plumes extending backward from the black crown and showing conspicuously over the dark back; while a ruby-crowned kinglet flitting about near by occasionally gave us a view of the brilliant feathers on his head.

In the woods an indigo bunting gave an unuaually favorable view, and caused great excitement among those of the party seeing him for the first time, while those who know him could not fail but be thrilled anew by his marvelous color.

Among the migrants on their way north were a blue-headed vireo, myrtle warblers, black-throated green warblers, and a Blackburnian.

Although birds were the chief objective of this walk the flowers claimed some attention, too. A few marsh marigolds, *Caltha palustris*, were still lingering: dwarf ginseng, *Panax trifolium*, was in bloom; the charming little golden saxifrage *Chrysosplenium americanum;* the wild pink, *Silene pennsylvanica;* and others; and many violets, the following of which were identified: Two yellows, *Viola pubescens* and *V. scabriuscula*, and five blues, *V. papilionacea*, *V. cucullata*, *V. sagittata*, *V. palmata* and *V. conspersa*.

EDITH DAY CHUBB

TRIP OF MAY 3–5

The promise of good times that Lake Mohonk gave last fall was fully kept this spring.

There were 25 of us there.

The weather left something to be desired but weather never bothers the Torreys.

Mr. Daniel Smiley who knows all the trails led the party into the hills and brought us back safely in spite of the obscuring fog.

A group of bird lovers had a before breakfast trip and reported 21 species. This does not include the numerous attempts to count the blue jays.

Mrs. Anderson was with us, so of course we had an interesting lichen trip and Mohonk abounds in lichens. Also her talk on Saturday evening was instructive and enjoyable. It was grand weather for lichens anyhow.

VERNON L. FRAZEE

NATURE OUTING, MAY 24–26, AT BRANCHVILLE, N. J.

Sixty-five members and friends attended this annual outing. Mr. Stephen R. Smith was in charge of the program, which was carefully prepared and varied in its appeal. On Saturday and Sunday geological trips were led by Dr. Meredith Johnson, Associated State Geologist to study rock outcrops and glacial phenomena. Mr. and Mrs. S. H. Chubb led early morning bird trips as well as morning and afternoon trips for bird study. Dr. Ralph Benedict led trips especially for the study of ferns. Dr. Harold N. Moldenke and Dr. H. K. Svenson led trips for the study of trees and flowering plants. On Friday and Saturday

evenings programs of music and lectures had been arranged in the recreation building of the inn. Accommodations at the Pines were comfortable as always. Mrs. Chubb compiled a list of over ninety species of birds seen on the trips by members of the party. Dr. Benedict found thirty-three ferns, including *Ophioglossum* at two different places, and Dr. Moldenke listed three hundred and forty-six trees and flowering plants. Dr. Moldenke reported that among the plants seen were *Poa alsodes*, *Carex eburnea*, *Chamaelirium luteum*, *Melanthium latifolium*, *M. virginicum*, *Parietaria pennsylvanica*, *Comandra umbellata*, *Cerastium nutans*, *Callitriche Austini*, *Clematis verticillaris*, *Lonicera dioica* and *Knautia arvensis*. Fine stands of ground hemlock, *Taxus canadensis*, columbine, *Aquilegia canadensis*, wild ginger, *Asarum canadense*, and rock cress, *Arabis lyrata* were observed. Four species of *Veronica*, four of *Crataegus*, eight of *Solidago* and eleven of *Viola* were identified. A beautiful example was found where *Phalaris arundinacea* had apparently mutated due to unfavorable environment in hard dry soil to form naturally the variety *picta* which is widely cultivated in our gardens as ribbon-grass.

GEORGE T. HASTINGS

PROCEEDINGS OF THE CLUB

Meeting of February 20, 1935

The meeting was called to order at The New York Botanical Garden at 3:30 P.M. by President Hazen. There were twenty-four present.

Minutes of the meetings of January 16 and February 5 were read and approved.

The following were unanimously elected to membership in the club: Miss Clair A. Brown, Botany Dept., L. S. U., Baton Rouge, La.; Mr. George Buckland, 849 Stanley Street, Schenectady, N. Y.; Mr. Leo A. Hanna, 1603 Second Street, Baker, Ore; Mrs. Helen Holmes Bancroft, 2 Wellington Square, Oxford, England; Prof. Charles B. Lipman, 3048 Life Science Building, University of California, Berkely, Cal.; Mr. W. T. McLaughlin, Fisk Hall, Northwestern University, Evanston, Ill.; Mr. Earl H. Newcomer, 2523 Ridge Road, Berkeley, Cal.; Mrs. Ruth Patrick Hodge, Biology Dept., Temple University, Philadelphia, Pa.; Prof. George B. Rigg, Botany Dept., University of Washington, Seattle, Wash.; Mr. C. M. Roberts, Dept. of Biology, Fairmont Teachers College, Fairmont, W. Va.; Prof. C. O. Rosendahl, Dept. of Botany, University of Minnesota, Minneapolis, Minn.; Dr. Francis J. Scully, 904 Medical Arts Building, Hot Springs, Ark.; Dr. William C. Steere, Botany Dept., University of Michigan, Ann Arbor, Mich.; Miss Vivian Trombetta, Barnard College, New York City; Prof. Ralph H. Wetmore, Biological Laboratories, Divinity Avenue, Cambridge, Mass.; Mr. G. Wittrock, New York Botanical Garden, Bronx Park, New York, N. Y.

The resignations of Mrs. Ellys Butler Moldenke, Mr. George L. Harrington, Mr. Henry Jacoby, Miss Ruth A Connolly, and Dr. Walter T. Swingle were accepted with regret.

The death of Mrs. Elizabeth B. Davenport was reported. Mrs. Davenport, who lived to be ninety years old, was a member in the club for many years. Although she had been totally blind for four or five years she kept up her membership in the Club in order to help by her dues.

A suggestion was made that we adopt a plan of having a

brief biographical report on members who have died. Dr. Howe moved that the chairman be authorized to appoint a committee of three, Dr. Barnhart chairman, to present a plan on how such a scheme as this might be carried out. The motion was seconded and passed.

Dr. S. M. Pady of The New York Botanical Garden gave an illustrated lecture on "Infection Studies on the Orange Rusts of Rubus."

Forman T. McLean
Secretary

Meeting of March 5, 1935

The meeting was called to order at the American Museum of Natural History at 8:15 P.M. by President Hazen. There were 40 present.

The following were unanimously elected to membership in the club:

Mr. Nathaniel R. Lubowe, Thomas Knowlton Junior High School, New York, N. Y.; Miss Mildred S. Narins, 1010 Bryant Avenue, New York, N. Y.; Dr. J. W. Severy, Department of Botany, Montana State University, Missoula, Mont.; Mr. Meyer L. Gottlieb, 1920 Harrison Avenue, New York, N. Y.

The resignation of Dr. W. D. Hoyt was accepted with regret.

Dr. E. D. Merrill, Director of The New York Botanical Garden gave a short talk on "Two Early Collections of Plants from New York State."

Dr. F. E. Denny of the Boyce Thompson Institute gave an interesting talk on "Effect of Chemicals on the Life Activities of Plants." This was illustrated by lantern slides.

Forman T. McLean
Secretary

Meeting of March 20, 1935

The meeting was held at The New York Botanical Garden, at 3:30 P.M., with twenty three present.

Minutes of the meetings of February 20 and March 6 were read and approved.

The following were elected to membership: J. P. Anderson, Box 530, Juneau, Alaska; Prof. Frank T. McFarland, Botany

Dept., University of Kentucky, Lexington, Ky.; Mr. James B. McNair, 818 South Ardmore Avenue, Los Angeles, Calif.; Mr. George B. Rosebach, 97 Church Street, Waltham, Mass.

The resignations of Mrs. John T. Fetherston of New York and Miss Gardis B. Thayer of Philadelphia, were accepted with regret.

The first paper on the scientific program was on "The Tumor producing Organism—Bacterium tumefaciens" by Dr. Michael Levine of the Montefiore Hospital. The author's abstract follows:

The bacterium which induces tumors or cancer growths on plants has been known since 1911. The organism is a rod-shaped cell which may be cultivated on a variety of media but appears to grow best on a decoction or soup made of white beans.

When this organism is introduced into a plant through wounds produced experimentally by pricking it with a needle or through wounds made accidentally by garden implements as in the cultivation of the soil, the plant becomes infected. In a short time, depending upon the plant, an overgrowth of tissue in the injured region results, which has been called crown gall or plant cancer. Cacti which have been studied recently show a long latent period in tumor formation. The giant tree cactus and the southern Opuntias produce galls experimentally in about a year after inoculation. The galls grow for a relatively long period, although the joints on which they are formed may show partial necrosis.

The organism which is responsible for these tumor growths in plants undergoes characteristic changes which may be associated with changes in their ability to secure food.

It has been mentioned above that *Bacterium tumefaciens* is a rod-shaped organism measuring 1.5 u to 3 $u \times .5$ u to .75 u. A smear taken from a culture of this organism, grown on bean broth agar and stained, shows these typical rods after two days. Subsequent smears made at daily intervals for a period of three to four months, show that the organisms diminish in size. At two months or earlier ghost cells are observed with a number of granular bodies. Examination of these cultures three or four months later, even after the agar is dry and the colonies of bacteria seem to have disappeared, shows these granular bodies. When these bodies are transferred to fresh agar the rod-shaped

structures again reappear in two days, and measure and behave like the organisms in the original culture. It has been shown that *Bacterium tumefaciens* can withstand drying and overwintering in the field. The granular bodies which they form appear to enable them to survive these adverse conditions. These bodies, while not recognized as spores morphologically, nevertheless seem to have some of the physiological characteristics of spores.

An organism which produces spore-like bodies has been found associated with *Bacterium tumefaciens*. It is mildly infectious and tumor-producing. It grows abundantly without visibly changing the character of the colony and produces spore-like bodies in three to six days.

The second paper, entitled "Bricks and Bubbles" was by Dr. R. P. Wodehouse of the Arlington Chemical Company. Following is the author's abstract:

It is generally conceded that the tetrakaidecahedron is the solid with the smallest surface area which is capable of partitioning space, and it is the form which soap bubbles in masses assume, and which the cells of many plants and animal tissues tend to assume. Under the conditions prevailing in these circumstances the tetrakaidecahedron is therefore, the ideal building block.

The artizan, however, never uses such a building blcck in the construction of walls and columns; for his purpose it would be eminently unsuited. Instead, experience has taught him that the ideal unit of construction for his purpose is a rectangular block about twice as broad and three times as long as high. Both kinds of building blocks are equally well adapted to the use to which they are put; the uses, however, are different. In the former case the block is required to sustain stresses which are equal in all directions, while in the latter it is required to sustain stresses which are unequal, since they are the result of the vertical thrust of gravity, with little or no pressure in any other direction. It may, therefore, be said that the tetrakaidecahedron is the building block of equal lateral stresses, while the rectangular, brick-shaped hexahedron is the building block of unequal lateral stresses.

MARSHALL A. HOWE
Secretary *pro tem.*

NEWS NOTES

Dr. Hugo deVries died on May 21 in his eighty-eighth year. He was best known for his development of the mutation theory and for his study of evolution by the experimental method. He was professor of botany at the University of Amsterdam and director of the Amsterdam Botanical Garden from 1878 to 1918. In 1900 he rediscovered the work of Gregor Mendel. In 1901 he published "The Mutation Theory."

Richard Morris Holman, associate professor of botany at the University of California, died suddenly on April 23. He was forty-nine years old.

The United States Department of Agriculture, in cooperation with the state agricultural experiment stations, foreign genetic institutions and private plant and animal breeders is making a search for the best existing strains of plant and animal life. There is being assembled a catalog of plant and animal germ plasm proved to be superior for such characters as productivity, disease resistance, and ability to transmit desirable characteristics. A committee under the chairmanship of O. E. Reed, chief of the Bureau of Dairy Industry, and including Dr. A. F. Blakeslee of the Department of Genetics, the Carnegie Institution, is assembling and analyzing a mass of data. The product of this survey will appear in the 1936 Yearbook of the Department of Agriculture and will probably require some 300 pages in that book.

At the second annual meeting of the Florida Botanical Garden and Arboretum Association, Dr. A. J. Grout of Newfane, Vt., and Manatee, Fla., was elected president of the Board of Trustees.

The Brooklyn Botanic Garden celebrated its twenty-fifth anniversary from May 13 to 16. The program included receptions in the garden and buildings, special exhibits and morning, afternoon and evening meetings with addresses stressing the advances in various fields of botany during the last twenty-five years. Among these addresses were—Virus diseases of plants,

twenty-five years of progress, Dr. L. O. Kunkel; Twenty-five years of cytology, Dr. Chas. E. Allen; Twenty-five years of genetics, Dr. Albert F. Blakeslee; Twenty-five years of plant physiology, Dr. Rodney H. True; Twenty-five years of ecology, Dr. H. A. Gleason; Twenty-five years of forestry, Dr. Samuel N. Spring; Twenty-five years of plant pathology, Dr. L. R. Jones; Twenty-five years of systematic botany, Dr. Elmer D. Merrill; Twenty-five years of paleobotany, Dr. G. R. Wieland; Twenty-five years of horticultural progress, Dr. W. E. Whitehouse; Twenty-five years of botanical education, Dr. Otis W. Caldwell; and Light on vegetation, 1910–1935, Dr. John M. Arthur.

New York State is celebrating this year the fiftieth anniversary of the founding of the Forest Commission, the forerunner of the State Conservation Commission. Beginning with a dinner at Albany on May 15th at which Dr. Rexford Guy Tugwell, Gifford Pinchot, Robert Moses and Henry S. Graves were the speakers, the celebration will include a celebration at Niagara Falls, a water pageant in central New York and a three-day celebration at Lake Placid. The celebration will be concluded at Lake Placid in September.

A new botanic garden has recently opened at Fort Worth, Texas. The garden covers thirty acres and was built largely by relief labor, financed by the CWA. The garden is under the control of the Board of Park Commissioners of the city. The development of the work is in the hands of R. C. Morrison, city forester.

THE TORREY BOTANICAL CLUB

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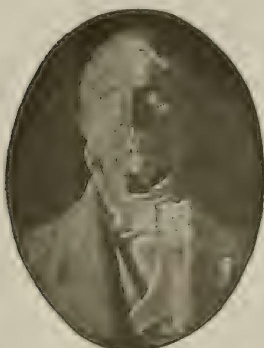

John Torrey, 1796-1873

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GEORGE T. HASTINGS
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The Cladoniae of New Jersey[1]

ALEXANDER W. EVANS

In certain parts of New Jersey, particularly in the pine barrens and in sheltered localities along the coast, the *Cladoniae* constitute an important and conspicuous part of the vegetation. The largest and most striking of the species belong to the subgenus *Cladina*, which includes the so-called "reindeer mosses," and to the subsection *Unciales* of the subgenus *Cenomyce*. In many regions species belonging to these two groups grow in large tufts or mats and cover over extensive areas, either by themselves or in association with herbaceous plants or low shrubs. Another group, the section *Cocciferae* of the subgenus *Cenomyce*, is characterized by scarlet apothecia, which are especially vivid in moist weather. Although the species of this group are less robust than the *Cladinae* and *Unciales*, they readily attract attention. The remaining species are brown-fruited forms belonging to the subgenus *Pycnothelia* and to the subsections *Chasmariae* and *Clausae* of the subgenus *Cenomyce*. A few of these may be as large as the *Cladinae* and *Unciales*, but the majority are smaller and relatively inconspicuous. Perhaps the most striking among them are those with cups, which may be wide open or closed by continuous membranes.

One of the earliest botanists, if not the earliest, to study the *Cladoniae* of New Jersey was C. F. Austin of Closter, Bergen County, who collected extensively in the vicinity of his home town. The first published references to his specimens are apparently those in Tuckerman's *Genera Lichenum* (20), which appeared in 1872. Two species, *C. mitrula* and *C. lepidota*, are here accredited to the state on the authority of Austin. A few years later Austin prepared a list of the New Jersey lichens

[1] Contribution from the Osborn Botanical Laboratory.

which he had found, and this list was published in Britton's *Preliminary Catalogue of the Flora of New Jersey* (2), which was issued in 1881. Austin's list, which was based on determinations made by Tuckerman, includes seventeen species of *Cladonia*, all but one from the vicinity of Closter.

Tuckerman's *Synopsis of the North American Lichens* (21), published in 1882, definitely accredits only five species of *Cladonia* to New Jersey, all of which are included in Austin's list. The records for four of these are based on Austin's material, the record for the fifth on specimens collected by Miss Biddlecome. No definite stations are mentioned.

In 1889 Britton published his *Catalogue of plants found in New Jersey* (3). For this work Austin's list of lichens was revised and amplified by Eckfeldt, who recognized twenty-one species of *Cladonia* for the state. For most of the species the New Jersey distribution is given by counties, but more definite stations are listed in certain cases.

Two years before the publication of Britton's Catalogue the first part Vainio's *Monographia Cladoniarum universalis* (22) made its appearance, the second part followed in 1894, and the third in 1897. The records for New Jersey in this important work are quoted directly from Tuckerman's Synopsis and give no additional information about stations. Vainio's monograph describes the species of *Cladonia* for the entire world and quickly became the standard authority for students of the genus. In the case of certain species the author presented views which were at variance with those previously held and emphasized characters which had hitherto been considered unimportant. It is not surprising, therefore, that some of the records in Austin's and Eckfeldt's lists are in need of revision. This is particularly true of species which have not been subsequently found in New Jersey. The writer has examined the New Jersey *Cladoniae* in the Tuckerman Herbarium at Harvard University, in the Austin collection of lichens at the New York Botanical Garden, and in the Eckfeldt Herbarium at the Philadelphia Academy of Natural Sciences, and has thus been able to make the necessary revision in certain cases by the study of the specimens upon which the records were based. There are, however, three species in the Eckfeldt list of which no specimens from New Jersey have been seen. These species are the following: *C. cornuta* (L.)

Fr., listed from Bergen and Warren Counties; *C. rangiferina* var. *alpestris*, now *C. alpestris* (L.) Rabenh., listed from the Pine Barrens; and *C. leporina* Fr., listed from Atco, Camden County. For the present, therefore, the occurrence of these three species in New Jersey must be considered doubtful.

For about forty years after the appearance of Britton's Catalogue the *Cladoniae* of New Jersey received but little attention. Collections, to be sure, were made from time to time by various botanists; but little, if anything, was published about these collections. In the last few years, however, interest in the *Cladoniae* of North America has been revived, and several papers dealing with the species of New Jersey have made their appearance. The most important of these is a report by Torrey on the *Cladoniae in the range of the Torrey Botanical Club* (**18**). In this report nineteen species are recorded from New Jersey, and definite stations are given for several of these species. Another interesting paper is by Lutz, who includes a list of thirteen species of *Cladonia* in his report on the *Ecological relations in the Pitch Pine Plains of southern New Jersey* (**8**). Other papers will be referred to in connection with the records for individual species.

In addition to Torrey's report, which contains descriptions, keys, and illustrations, several other papers have recently appeared on the *Cladoniae* of the eastern United States. These include a paper on *C. Beaumontii* by Robbins (**10**), a paper on *C. lepidota* by the same author (**11**), a report by the writer on the *Cladoniae of Connecticut* (**4**), two supplements to this report (**5**,**6**), and an illustrated paper by Robbins and Blake on *Cladonia in the District of Columbia and vicinity* (**12**). Although most of these papers include no direct references to specimens of *Cladonia* from New Jersey, they treat numerous species and forms that are represented in the flora of the state. They are therefore included in the bibliography at the close of the present report.

The species in the following list are arranged according to the classification of Vainio (see **22**), which has been adopted by most of the recent writers on *Cladonia*. The stations for the various species and forms are listed alphabetically, first by counties and then by localities under the counties, and will give some idea of the extent to which exploration for *Cladoniae*

within the state had progressed down to the close of 1934. Most of the records are based on specimens in the Yale Herbarium. Where this is not the case the place of preservation is indicated as follows: F., Farlow Herbarium, Harvard University (including the Tuckerman collection); N. Y., herbarium of the New York Botanical Garden (including the Austin collection); and P., herbarium of the Philadelphia Academy of Natural Sciences (including the Eckfeldt collection).

Descriptions and the citation of synonymy in the list are reduced to the lowest limits. They are given as a rule only in cases where the species or forms in question have not been treated in the recent American literature. Where they have been treated references are given, so that the necessary data can easily be found.

In the determination of the New Jersey *Cladoniae* the writer has received assistance from the late C. A. Robbins, of Onset, Massachusetts, and from Dr. Heinrich Sandstede, of Oldenburg, Germany; and records based on the determinations of these authorities are definitely noted. Specimens marked simply "1932" were collected by the writer in September of that year. These collections were made on an excursion to the Pine Barrens, under the guidance of Mrs. Gladys P. Anderson, Mr. and Mrs. W. G. Taylor, and Mr. R. H. Torrey (see Torrey, **16**). Species and forms recorded for the first time from New Jersey are marked with asterisks (*), even if they may have been reported previously under different names.

The various collectors mentioned in the list, aside from the writer, are the following: Mrs. Gladys P. Anderson, L. W. Anderson, C. F. Austin, Miss H. F. Biddlecome, S. F. Blake, L. W. Bowen, N. L. Britton, G. F. Dillman, J. W. Eckfeldt, Miss Margaret Fulford, H. A. Green, Mrs. Carolyn W. Harris, E. P. Killip, E. C. and G. M. Leonard, H. L. Lutz, F. A. Musch, C. C. Plitt, Mr. and Mrs. W. G. Taylor, R. A. Torrey, and Miss H. A. Walker. It is hoped that the list may encourage further collection of *Cladoniae* within the state.

Subgenus 1. CLADINA

1. CLADONIA RANGIFERINA (L.) Web. (**4**, p. 375; **12**, *pl. 210, f. 1;* **18**, *pl. 1, f. 1*). On earth in fields and open woods and on thin soil over rocks. The species, as now restricted, is less abun-

dant in New Jersey than the published records might seem to indicate (**3**, p. 373). Most, if not all, of the New Jersey specimens bearing the name *C. rangiferina* in the Austin and Tuckerman collections represent *C. tenuis*, and no New Jersey specimens are present in the Eckfeldt collection. Torrey reports the species from the "Highlands" of New Jersey (**18**, p. 120), and Thompson lists it from the Wawayanda cedar swamp (**14**, p. 22). The New Jersey specimens seen by the writer are listed below, some of them as distinct forms. BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins). OCEAN: Point Pleasant (*Plitt*, 1907, F.) and Wrangel Brook (*Torrey*, 1934). SUSSEX: Wawayanda Mountain, Vernon (*Torrey*, 1933).

1a.* CLADONIA RANGIFERINA f. CRISPATA Coem. (**4**, p. 377). PASSAIC: near Hewitt (*Dillman*, 1934).

1b.* CLADONIA RANGIFERINA f. STYGIA Fr. Sched. Crit. Lich. Suec. Exsic. 22. 1826. WARREN: among boulders on shore of Sunfish Pond, Kittatiny Mountain (*Torrey*, 1933, det. Sandstede); apparently the first record for North America. According to Sandstede this form grows in localities that are sometimes under water. The plants, in consequence, become blackened and more or less verruculose in the older parts.

1c.* CLADONIA RANGIFERINA f. PROLIFERA Flot. (**4**, p. 377). PASSAIC: near Hewitt (*Dillman*, 1934).

2. CLADONIA SYLVATICA (L.) Hoffm. (**4**, p. 378). On earth in fields and open woods. BURLINGTON: Batsto (1932) and West Plains (*Lutz*, 1932, see **8**, p. 12). CAMDEN: Atco (*Eckfeldt*, 1882, F., P., listed in **3**, p. 373, as *C. rangiferina* var. *sylvatica*). OCEAN: near Forked River (*Dillman*, 1933, det. Sandstede), Lakehurst (*Torrey*, 1934, det. Sandstede), Simplace (*Killip*, 1930), Davenport Branch of Tom's River (*Dillman*, 1934). PASSAIC: Skylands (*Britton*, 1917, N. Y., det. Riddle). WARREN: near Millbrook (*Torrey*, 1934). Austin's record for *C. sylvatica* (**2**, p. 164), under the name *C. rangiferina* var. *sylvatica*, was based on material of *C. tenuis*.

2a. CLADONIA SYLVATICA f. PYGMAEA Sandst. (**4**, p. 381). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins) and West Plains (*Lutz*, 1928, det. Sandstede, see **8**, p. 12). OCEAN COUNTY: near Tom's River (*E. C. and G. M. Leonard*, 1928, det. Sandstede).

2b.* Cladonia sylvatica f. decumbens Anders, Hedwigia **61**: 358. 1920. Burlington: New Gretna (*Musch*, 1928, det. Robbins); apparently the first record for North America. The plants grew in depressed, subcircular mats and show a yellowish pigmentation.

3. Cladonia mitis Sandst. (**4**, p. 381; **12**, *pl. 210, f. 5;* **18**, *pl. 1, f. 3*). On earth in fields and open woods; reported from the "New Jersey Pine Barrens" by Torrey (**18**, p. 120). Burlington: Brown's Mills (1932) and New Gretna (*Musch*, 1928, det. Robbins). Ocean: Lahaway (*Torrey*, 1933, det. Sandstede), Laurelton (*Torrey*, 1934), Seaside Park (1932), and Davenport Branch of Tom's River (*Dillman*, 1934).

3a.* Cladonia mitis f. divaricata Sandst. (**4**, p. 383). Burlington: New Gretna (*Musch*, 1928, det. Robbins and Sandstede) and West Plains (1932, det. Sandstede).

3b.* Cladonia mitis f. prolifera Sandst. (**4**, p. 383). Burlington: New Gretna (*Musch*, 1928, det. Robbins) and West Plains (1932).

4. Cladonia tenuis (Floerke) Harm. (**4**, p. 384; **12**, *pl. 210, f. 3;* **18**, *pl. 1, f. 2*). On earth in fields and open woods; the most abundant species of *Cladina* in New Jersey. Bergen: Closter (*Austin*, 1864, F., N. Y., listed in **2**, p. 164, as *C. rangiferina* and as *C. rangiferina* var. *sylvatica*). Burlington: Bass River State Forest (*Torrey*, 1934), Batsto (1932), Skit's Branch of Batsto River (*Torrey*, 1933), Brown's Mills (1932), and West Plains (*Lutz*, 1930, 1932, see **8**, p. 12; *Evans*, 1932). Camden: Atco (*Green*, 1882, P.). Cumberland: Vineland (*Miss Walker*, 1893, N. Y., distributed in Cummings, Williams, and Seymour, Lich. Bor.-Amer. No. 63, as *C. rangiferina* var. *sylvatica;* referred by Merrill, **9**, p. 91, to *C. sylvatica* f. *laxiuscula*). Ocean: Bamber Lake (*Dillman*, 1934), near Barnegat (*E. C. and G. M. Leonard*, 1928), Dover Forge (*Dillman*, 1934), Hornerstown (*Torrey*, 1933), Lakehurst (*Torrey*, 1934), Lakewood (*Mrs. Anderson*, 1923), Laurelton (*Torrey*, 1934), Seaside Park (1932), near Tom's River (*E. C. and G. M. Leonard*, 1928), and Wrangel Brook (*Torrey*, 1934). Passaic: West Milford (*Torrey*, 1934). Sussex: Wawayanda Mountain, Vernon (*Torrey*, 1933). The

species is listed from the "Pine Barrens" by Torrey (**18**, p. 121).

4a.* CLADONIA TENUIS f. SETIGERA Sandst. (**5**, p. 123). OCEAN: Double Trouble (*Anderson*, 1934) and Hornerstown (*Torrey*, 1933). SUSSEX: Wawayanda Mountain, Vernon (*Torrey*, 1933).

Subgenus 2. PYCNOTHELIA

5. CLADONIA PAPILLARIA (Ehrh.) Hoffm. (**4**, p. 389). On sandy soil in exposed localities. In the New Jersey material of this common and variable species the three forms listed below are represented. The species is reported by Austin from Closter (**2**, p. 164), by Tuckerman from "New Jersey, Austin" (**21**, p. 245), by Eckfeldt from Bergen County and from Atco, Camden County (**3**, p. 373), by Vainio from "New Jersey, Austin" (**22**, p. 52), and by Torrey from the New Jersey Pine Barrens (**18**, p. 121). Eckfeldt's specimens from Atco are not preserved in his collection.

5a. CLADONIA PAPILLARIA f. MOLARIFORMIS (Hoffm.) Schaer. (**4**, p. 390; **12**, *pl. 210, f. 6*, in part; **18**, *pl. 1, f. 4*). Austin's New Jersey specimens of *C. papillaria* are referable to this form but are not definitely labeled "Closter," either in the Tuckerman collection or in the herbarium of the New York Botanical Garden. The following additional specimens of f. *molariformis* have been examined by the writer:—BURLINGTON: Bass River State Forest (*Torrey*, 1934), Brown's Mills (1932), Lower Bank (1932), and West Plains (*Lutz*, 1932, see **8**, p. 12). MONMOUTH: Navesink (*Evans*, 1934). OCEAN: near Forked River (*Dillman*, 1933), Hornerstown (*Torrey*, 1933), Lakehurst (*Torrey*, 1934), Lakewood (*Mrs. Harris*, 1908, F.), and Wrangel Brook (*Torrey*, 1934). PASSAIC: Franklin Lake (*Torrey*, 1933).

5b.* CLADONIA PAPILLARIA f. STIPATA Floerke (**4**, p. 391). BURLINGTON: Lower Bank (1932). MONMOUTH: Navesink (*Evans*, 1934). PASSAIC: Franklin Clove (*Torrey*, 1933).

5c. CLADONIA PAPILLARIA f. PAPILLOSA Fr. (**4**, p. 391; **12**, *pl. 210. f. 6*, in part). Often mixed with f. *molariformis*. BURLINGTON: Brown's Mills (1932), Lower Bank (1932), and West Plains (*Lutz*, 1932, see **8**, p. 12). MONMOUTH: Navesink (*Evans*, 1934). OCEAN: Hornerstown (*Torrey*, 1933). PASSAIC: Franklin Lake (*Torrey*, 1933).

Subgenus 3. CENOMYCE

Section 1. COCCIFERAE

Subsection 1. SUBGLAUCESCENTES

6. CLADONIA FLOERKEANA (Fr.) Floerke (**4**, p. 392). On rotten wood and on thin soil over rocks. This species, according to Torrey (**18**, p. 121), is found "along New Jersey Pine Barren streams" and is usually represented by the following variety:—

6a. CLADONIA FLOERKEANA var. INTERMEDIA Hepp (**4**, p. 392; **12**, *pl. 210, f. 8;* **18**, *pl. 1, f. 7*). WARREN: Kittatiny Mountain (*Torrey*, 1933). The writer has no material of *C. Floerkeana* from the Pine Barrens.

7.* CLADONIA BACILLARIS (Ach.) Nyl. (**4**, p. 395; **18**, *pl. 1, f. 6*). On logs, banks, and thin soil over rocks. BURLINGTON: Lower Bank (1932), New Gretna (*Musch*, 1928, det. Robbins), and Speedwell (1932). MONMOUTH: Navesink (*Evans*, 1934). MORRIS: Green Pond Mountain (*Dillman*, 1934). OCEAN: Barnegat Island (*Torrey*, 1934), Dover Forge (*Dillman*, 1934), Hornerstown (*Torrey*, 1933), Seaside Park (1932), Davenport Branch of Tom's River (*Dillman*, 1934), and near Whitings (*Torrey*, 1933). PASSAIC: West Milford (*Torrey*, 1934). WARREN: Johnsonburg (*Torrey*, 1934) and Kittatiny Mountain (*Torrey*, 1933). The New Jersey specimens are not definite as to form; but f. *clavata* (Ach.) Vainio, which is well figured by Robbins and Blake (**12**, *pl. 210, f. 9*), is surely to be expected.

8. CLADONIA MACILENTA Hoffm. (**4**, p. 398). On earth and on thin soil over rocks. This species is listed by Austin from Closter (**2**, p. 165) and by Eckfeldt from Atco, Camden County, as well as from Bergen County (**3**, p. 373); but no New Jersey specimens referred to *C. macilenta* are to be found in either the Austin or the Eckfeldt collection. Torrey reports the species from the Pine Barrens and notes that f. *styracella* is the usual form (**18**, p. 121).

8a. CLADONIA MACILENTA f. STYRACELLA (Ach.) Vainio (**4**, p. 399; **12**, *pl. 210, f. 10;* **18**, *pl. 1, f. 10*). MORRIS: Green Pond Mountain (*Dillman*, 1934). The writer has seen no material of this form from the Pine Barrens.

8b.* CLADONIA MACILENTA f. TOMENTOSULA (Floerke) Aigret, Bull. Soc. Roy. Bot. Belgique **40**: 86. 1901 (as *C. macilenta*

dd. *tomentosula*). *Capitularia macilenta* var. *tomentosula* Floerke, Ges. Naturf. Freunde Mag. **2**: 214. 1818. OCEAN: Seaside Park (1932, det. Sandstede); apparently the first record for North America. The primary squamules of f. *tomentosula* are well developed, and the podetia are much like those of f. *styracella*, except that they are more robust and more densely sorediose. They are, in other words, simple or shortly and sparingly branched in the upper part, and the podetial surface is free (or nearly so) from squamules. European writers tend to subordinate f. *tomentosula* to f. *styracella*, giving the latter varietal rank.

9. CLADONIA DIDYMA (Fée) Vainio (**5**, p. 125; **18**, *pl. 1*, *f. 8*). On decaying wood and on soil rich in humus. Torrey reports the species from the "Pine Barren swamps" and also from the Wawayanda cedar swamp (**16**, p. 167; **18**, p. 122). OCEAN: near Forked River (*Dillman*, 1933); this specimen is indefinite as to form, but the other New Jersey specimens seen by the writer are referable to the following forms:—

9a.* CLADONIA DIDYMA f. MUSCIGENA (Eschw.) Vainio, Acta Soc. F. et Fl. Fennica **4**: 141. 1887 (as *α. muscigena*). *C. muscigena* Eschw. in Martius, Fl. Brasil. **1**[1]: 262. 1833. OCEAN: Double Trouble (1932, det. Sandstede). SUSSEX: Wawayanda cedar swamp (*Torrey*, 1933, det. Sandstede). This form represents the more typical development of the species and is the form usually found in tropical and subtropical regions. It is larger than the following and often produces apothecia.

9b.* CLADONIA DIDYMA f. SUBULATA Sandst. (**5**, p. 127). BURLINGTON: Speedwell (1932). OCEAN: Double Trouble (1932), Seaside Park (1932), and near Whitings (*Torrey*, 1933). The podetia of this form are more slender than those of f. *muscigena* and are usually sterile.

Subsection 2. STRAMINEO-FLAVIDAE

10. CLADONIA PLEUROTA (Floerke) Schaer. (**4**, p. 400). On earth and on thin soil over rocks. BERGEN: Closter (*Austin*, without date, N. Y., listed in **2**, p. 164, as *C. cornucopioides*). BURLINGTON: Brown's Mills (1932), Lower Bank (1932), and West Plains (*Lutz*, 1932, see **8**, p. 12). MONMOUTH: Navesink (*Evans*, 1934). OCEAN: Lakehurst (*Torrey*, 1934). WARREN: Kittatiny Mountain (*Torrey*, 1933). Eckfeldt lists *C. cornuco-*

pioides from the Blue Mountains, Sussex County (**3**, p. 373), but no specimens so named are present in his collection. For figures of *C. pleurota* f. *decorata* Vainio, see Robbins and Blake (**12**, *pl. 210*, *f. 12*) and Torrey (**18**, *pl. 1*, *f. 11*). Some of the specimens listed above approach this form.

10a.* Cladonia pleurota var. frondescens (Nyl.) Oliv. (**4**, p. 403). Burlington: Lower Bank (1932). Ocean: Lakehurst (*Torrey*, 1934).

11.* Cladonia Ravenelii Tuck. Syn. North Amer. Lich. **1**: 254. 1882. On old wood. Ocean: Seaside Park (1932, det. Sandstede). This interesting and variable species is mostly subtropical and tropical in its distribution, and its discovery in New Jersey represents a marked extension of its known range to the northward. It agrees with *C. macilenta* in giving a bright yellow color with KOH, but is distinguished by its minute primary squamules and by the granulate-verrucose surface of the podetia, which may or may not be cup-forming.

12. Cladonia cristatella Tuck. (**4**, p. 403). On old wood and on soil rich in humus; widely distributed in New Jersey and very variable. Austin listed the species from Closter (**2**, p. 165) and Eckfeldt (**3**, p. 374) added Atco, Camden County (*Eckfeldt*), and May's Landing, Atlantic County (*Peters*). Vainio (**22**[1], p. 218) cites it simply from "New Jersey," on the basis of specimens collected by Miss Biddlecome. Torrey has since reported *C. cristatella* from Andover, Sussex County (**17**, p. 50), while Thompson has listed it from the Wawayanda cedar swamp (**14**, p. 21). Some of the specimens upon which these records were based are listed below under definite forms, but no specimens from May's Landing have been available for study.

12a. Cladonia cristatella f. Beauvoisii (Del.) Vainio (**4**, p. 405; **12**, *pl. 210*, *f. 14*, in part; **18**, *pl. 1*, *f. 5*, in part). Atlantic: Inskip (*Blake*, 1928, det. Robbins). Bergen: Closter (*Austin*, no date, N. Y., listed in **2**, p. 165, as *C. cristatella*). Burlington: Bass River State Forest (*Torrey*, 1934), East Plains (*Lutz*, 1932, see **8**, p. 12), Lower Bank (1932), New Gretna (*Musch*, 1928, det. Robbins), near Pemberton (*E. C. and G. M. Leonard*, 1928), and West Plains (*Lutz*, 1932, see **8**, p. 12). Camden: Atco (*Eckfeldt*, 1882, P., listed in **3**, p. 374, as *C. cristatella; Green*, 1882, N. Y.). Monmouth: Navesink (*Evans*, 1934). Ocean:

near Barnegat (*E. C. and G. M. Leonard*, 1928), Barnegat Island (*Torrey*, 1934), and Double Trouble (1932). PASSAIC: West Milford (*Torrey*, 1934).

12b. CLADONIA CRISTATELLA f. VESTITA Tuck. (**4**, p. 407; **12**, *pl. 210, f. 14*, in part; **18**, *pl. 1, f. 5*, in part). Reported from "New Jersey" by Tuckerman (**20**, p. 255) and by Vainio (**22**[1], p. 218) on the basis of specimens collected by Miss Biddlecome. These specimens, which are in the Tuckerman collection, are dated 1877 but are without further data. The writer has seen f. *vestita* also from the following stations:— ATLANTIC: Inskip (*Blake*, 1928, det. Robbins). BURLINGTON: near Chatsworth (*E. C. and G. M. Leonard*, 1928), near Pemberton (*E. C. and G. M. Leonard*, 1928), and West Plains (*Lutz*, 1932, see **8**, p. 12). MONMOUTH: Navesink (*Evans*, 1934). OCEAN: Barnegat Island (*Torrey*, 1934), Double Trouble (1932) and New Egypt (*Mrs. Anderson*, 1932). PASSAIC: West Milford (*Torrey*, 1934). WARREN: Kittatiny Mountain (*Torrey*, 1933). The form has been reported also from Moonachie, Bergen County (see Torrey, **19**, p. 132).

12c.* CLADONIA CRISTATELLA f. SQUAMOSISSIMA Robbins (**4**, p. 408). PASSAIC: West Milford (*Torrey*, 1934). WARREN: Kittatiny Mountain (*Torrey*, 1933).

12d.* CLADONIA CRISTATELLA f. SIMULATA Robbins (**4**, p. 409). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins).

12e.* CLADONIA CRISTATELLA f. SCYPHULIFERA Sandst. (**6**, p. 41). BURLINGTON: Lower Bank (1932). OCEAN: Dover Forge (*Dillman*, 1934).

12f.* CLADONIA CRISTATELLA f. OCHROCARPIA Tuck. (**4**, p. 409). BURLINGTON: Lower Bank (1932). OCEAN: Lakehurst (*Torrey*, 1934).

12g.* CLADONIA CRISTATELLA f. SQUAMULOSA Robbins (**4**, p. 410). OCEAN: Barnegat Island (*Torrey*, 1934).

13. CLADONIA INCRASSATA Floerke (**5**, p. 129; **12**, *pl. 210, f. 13*, as *C. paludicola;* **18**, *pl. 1, f. 12*). On decaying wood and peaty soil. The species has been reported by Torrey from the Pine Barrens (**18**, p. 123) and from Moonachie, Bergen County (**19**, p. 131), and by Torrey and Thompson from the Wawayanda cedar swamp (**18**, p. 123; **14**, p. 21). The following specimens have been examined by the writer:— BURLINGTON: Lower Bank

(1932) and West Plains (*Torrey*, 1932). OCEAN: Dover Forge (*Dillman*, 1934), Double Trouble (1932), near Whitings (*Torrey*, 1933), and Wrangel Brook (*Torrey*, 1934). SUSSEX: Wawayanda cedar swamp (*Torrey*, 1933).

13a.* CLADONIA INCRASSATA f. SQUAMULOSA (Robbins) Evans (**5**, p. 129). BURLINGTON: West Plains (*Torrey*, 1932). OCEAN: Double Trouble (1932).

Section 2. OCHROPHAEAE

Subsection 1. UNCIALES

14. CLADONIA UNCIALIS (L.) Web. (**4**, p. 413; **12**, *pl. 2, f. 1*). On earth in fields or open woods. This abundant and variable species is listed by Austin from Ocean County (**2**, p. 164), and this record is cited by Eckfeldt (**3**, p. 373). It was probably based on a specimen in the Tuckerman Herbarium, collected by Austin in the "Pines of New Jersey." A "var. *adunca* Ach." is listed also by Austin from Ocean County, and the same variety from Camden County is included in Eckfeldt's list. Apparently no New Jersey specimens bearing this varietal name have been preserved, but the Eckfeldt collection contains specimens of *C. uncialis*, correctly determined but somewhat indefinite as to form. These are listed below, together with other specimens belonging to the same category. Torrey reports *C. uncialis* from the Pine Barrens (**18**, p. 123). BERGEN: Closter (*Austin*, no date, N. Y.). BURLINGTON: Batsto (1932), Brown's Mills (1932), Lower Bank (1932), New Gretna (*Musch*, 1928, det. Robbins), and West Plains (*Lutz*, 1932, see **8**, p. 12; *Evans*, 1932; *Miss Fulford*, 1932). OCEAN: Bamber Lake (*Dillman*, 1934), near Barnegat (*E. C. and G. M. Leonard*, 1928), Dover Forge (*Dillman*, 1934), near Forked River (*Dillman*, 1933), Hornerstown (*Torrey*, 1933), Lahaway (*Torrey*, 1933), Lakehurst (*Torrey*, 1934), Laurelton (*Torrey*, 1934), Seaside Park (1932), Davenport Branch of Tom's River (*Dillman*, 1934), and near Tom's River (*E. C. and G. M. Leonard*, 1928). PASSAIC: West Milford (*Torrey*, 1934). SUSSEX: Wawayanda Mountain (*Torrey*, 1933).

14a.* CLADONIA UNCIALIS f. OBTUSATA (Ach.) Vainio (**4**, p. 415; **12**, *pl. 211, f. 1*, in part). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins). OCEAN: Seaside Park (1932).

14b. CLADONIA UNCIALIS f. SUBOBTUSATA Coem. (**4**, p. 416). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins) and

West Plains (*Lutz*, 1932, see **8**, p. 12). OCEAN: Bamber Lake (*Dillman*, 1934) and near Forked River (*Dillman*, 1933, det. Sandstede).

14c.* CLADONIA UNCIALIS f. DICRAEA (Ach.) Vainio (**4**, p. 416; **12**, *pl*, *211*, *f*. *1*, in part). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins and Sandstede).

14d.* CLADONIA UNCIALIS f. SPINOSA Oliv. (**4**, p. 417). BURLINGTON: New Gretna (*Musch*, 1928, det. Sandstede).

14e. CLADONIA UNCIALIS f. SETIGERA Anders (**5**, p. 134). BURLINGTON: West Plains (*Lutz*, 1932, see **8**, p. 12). OCEAN: Lahaway (*Torrey*, 1933) and Laurelton (*Torrey*, 1934).

15. CLADONIA CAROLINIANA (Schwein.) Tuck. (**5**, p. 134). On earth in fields and open woods. Torrey reports the species from the Pine Barrens and notes that the three forms listed below "may be found . . . in south Jersey" (**18**, p. 124).

15a. CLADONIA CAROLINIANA f. DILATATA Evans (**5**, p. 138; **18**, *pl*. *2*, *f*. *2*). BURLINGTON: Bass River State Forest (*Torrey*, 1934), Skit's Branch of Batsto River (*Torrey*, 1934), Lower Bank (1932), New Gretna (*Musch*, 1928, det. Robbins as *C. caroliniana*), and West Plains (*Lutz*, 1932, see **8**, p. 12; *Evans*, 1932). CAMDEN: Atco (*Eckfeldt*, 1882, mixed with *C. uncialis*, P.; *Green*, no date, N. Y.). OCEAN: Bamber Lake (*Dillman*, 1934), Double Trouble (1932), Dover Forge (*Dillman*, 1934), near Forked River (*Dillman*, 1933), Lahaway (*Torrey*, 1933), Lakehurst (*Torrey*, 1934), and Seaside Park (1932). PASSAIC: near Hewitt (*Dillman*, 1934) and Skylands (*Britton*, 1917, N. Y.). SUSSEX: Wawayanda Mountain (*Torrey*, 1933).

15b. CLADONIA CAROLINIANA f. FIBRILLOSA Evans (**5**, p. 139). BURLINGTON: Bass River State Forest (*Torrey*, 1934), Skit's Branch of Batsto River (*Torrey*, 1934), and West Plains (*Lutz*, 1932, see **8**, p. 12). CAMDEN: Atco (*Green*, no date, N. Y.). OCEAN: near Forked River (*Dillman*, 1933). SUSSEX: Wawayanda Mountain (*Torrey*, 1933).

15c. CLADONIA CAROLINIANA f. TENUIRAMEA Evans (**5**, p. 139). BURLINGTON: East Plains (*Lutz*, 1932, see **8**, p. 12), Lower Bank (1932), New Gretna (*Musch*, 1928), Pleasant Mills (*Mrs. Anderson*, 1932), and West Plains (*Lutz*, 1932, see **8**, p. 12). MONMOUTH: near Manasquan (*Plitt*, 1909). OCEAN: Barnegat Island (*Torrey*, 1934), near Barnegat (*E. C.* and *G. M. Leonard*,

1928; *Killip*, 1930) Double Trouble (1932), Lahaway (*Torrey*, 1933), and Seaside Park (1932).

Professor Plitt's specimens were distributed by Merrill in his Lichenes Exsiccati, No. 72, as a new species, under the name "*Cladonia tenuissimum* [*sic*] Merrill," and the station was incorrectly given as "near Anisquam." These specimens, in the writer's opinion, represent a slender development of f. *tenuiramea*. Merrill's name must be regarded as a *nomen nudum*, since it has not been adequately published. Sandstede, however (**13**, p. 44), refers to it in connection with *C. dimorphoclada* Robbins, now known as *C. caroliniana* f. *dimorphoclada* (Robbins) Evans (**5**, p. 137). The specific name is first given incorrectly as "*minutissima* Merrill," but the error is corrected on a supplementary page.

16. Cladonia Boryi Tuck. (**4**, p. 417; **18**, *pl. 2*, *f. 3*). On earth in fields and open woods. Torrey reports the species from the New Jersey Pine Barrens (**18**, p. 124), but only two specimens from the state have been seen by the writer. These may be referred to the following form:—

16a. Cladonia Boryi f. reticulata (Russell) Merill (**5**, p. 141). Burlington: New Gretna (*Musch*, 1928, det. Robbins as *C. Boryi*). Ocean: near Bamber Lake (*Dillman*, 1934).

Subsection 2. Chasmariae

Group 1. Microphyllae

17. Cladonia furcata (Huds.) Schrad. (**4**, p. 420). On earth in fields and open woods and on thin soil over rocks. According to Austin's list (**2**, p. 164) *C. furcata* and the varieties *crispata*, *racemosa*, and *subulata* are all found at Closter, but no specimens referred to either var. *crispata* or var. *subulata* are preserved in his collections. In Eckfeldt's list (**3**, p. 373) the species is reported from both Bergen and Camden Counties, and the same three varieties are listed. Torrey reports the species from Andover (**17**, p. 50) and Thompson (**14**, p. 22) from the Wawayanda cedar swamp. The few New Jersey specimens of *C. furcata* and its forms, which have been studied by the writer, may now be listed. Bergen: Closter (*Austin*, no date, N. Y.). Warren: Kittatiny Mountain (*Torrey*, 1933). These two specimens consist of young plants and are indefinite as to form.

17a. CLADONIA FURCATA var. RACEMOSA (Hoffm.) Floerke (**4**, p. 422; **12**, *pl. 211, f. 4;* **18**, *pl. 2, f. 4*). BERGEN: Closter (*Austin*, no date, F., N. Y., see **2**, p. 164). WARREN: Kittatiny Mountain (*Torrey*, 1933).

17ab.* CLADONIA FURCATA var. RACEMOSA f. SQUAMULIFERA Sandst. (**5**, p. 153). BERGEN: Closter (*Austin*, no date, F., N. Y.). MORRIS: Oak Ridge (*Torrey*, 1934). SUSSEX: Wawayanda Mountain (*Torrey*, 1933). WARREN: Kittatiny Mountain (*Torrey*, 1933) and near Millbrook (*Torrey*, 1934).

18. CLADONIA FLORIDANA Vainio in Sandstede, Clad. Exsic *1196*. 1922; Robbins, Rhodora **29**: 136. *pl. 157*. 1927. On exposed sandy soil; first reported from New Jersey by Blake (**1**). ATLANTIC: Inskip (*Blake*, 1928, det. Robbins). BURLINGTON: Brown's Mills (1932), East Plains (*Lutz*, 1932, see **8**, p. 12), Lower Bank (1932), Speedwell (1932), and West Plains (*Lutz*, 1932, see **8**, p. 12). OCEAN: Double Trouble (1932), Lakehurst (*Torrey*, 1934), and Seaside Park (1932). Although *C. floridana* was based on specimens collected by Severin Rapp in Florida, its known range now extends as far north as eastern Long Island and the Cape Cod region. It has not been found, however, in either Connecticut or Rhode Island. The occurrence of the species in the Pine Barrens of New Jersey has been noted by Torrey (**18**, p. 126).

A full description of *C. floridana* has been published by Robbins (**10**), who recognized five different forms. His account emphasizes the fact that both the primary squamules and the podetia give a distinct yellow color with KOH. The podetia are further distinguished by having a smooth cortex, which is never servediose, and by being usually more or less branched above. The branches are short and rigid and the axils are usually, but not invariably, "round-perforate." The tips of the branches in sterile plants are pointed and cupless but in fertile plants may be obsoletely cup-forming. Both squamulose and esquamulose forms occur.

18a.* CLADONIA FLORIDANA f. TYPICA Robbins, Rhodora **29**: 137. *pl. 157, f. 5*. 1927. BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins) and West Plains (*Miss Fulford*, 1932). OCEAN: Dover Forge (*Dillman*, 1934). The podetia in this form are both fertile and squamulose.

18b. CLADONIA FLORIDANA f. ESQUAMOSA Robbins, Rhodora **29**: 137, *pl. 157*, *f. 4*. ATLANTIC: Inskip (*Blake*, 1928, det. Robbins). BURLINGTON: New Gretna (*Musch*, 1928, det. Robbins) and West Plains (*Lutz*, 1932, see **8**, p. 12). The podetia are fertile but without squamules.

19.* CLADONIA SANTENSIS Tuck. Am. Jour. Sci. II. **25**: 427. 1858. OCEAN: Dover Forge (*Dillman*, 1934), Lakehurst (*Torrey*, 1934), near Laurelton (*Torrey*, 1934), and near Whitings (*Torrey*, 1933, determination verified by Sandstede). The type-material of *C. santensis* was collected by H. W. Ravenel at Santee Canal, South Carolina, and the species has been found also in Florida by Rapp. Its discovery in New Jersey represents a marked extension of its known range to the northward. The species agrees with *C. floridana* in giving a vivid yellow color with KOH but shows distinctive features, not only in the primary thallus, but also in the podetia. These features are clearly brought out in the description by Robbins (**10**, p. 136). As shown by this account the primary squamules of *C. santensis* are "laciciate to dentate-crenate" and the cortex of the podetia is "globose-areolate." In *C. floridana*, on the other hand, the primary squamules are "subentire or dentate to sublobate," and the cortex of the podetia is "smooth, subrugose or slightly cracked."

20. CLADONIA SQUAMOSA (Scop.) Hoffm. (**4**, p. 432). On earth in open woods, on logs, and on thin soil over rocks. In Austin's list (**2**, p. 164) *C. squamosa* and the varieties *delicata* and *caespiticia* are recorded from Closter. In Eckfeldt's list (**3**, p. 373) the varieties are rightfully given specific rank and are recorded from the Pine Barrens, as well as from Bergen County. The specimens here listed under the species are not definite as to form. BERGEN: Closter (*Austin*, 1864, F., see **20**, p. 246). BURLINGTON: Speedwell (1932). MORRIS: Green Pond Mountain (*Dillman*, 1934). OCEAN: Bamber Lake (*Dillman*, 1934), Double Trouble (1932), Hornerstown (*Torrey*, 1933), Laurelton (*Torrey*, 1934), and near Whitings (*Torrey*, 1933). PASSAIC: Green Pond (*Bowen*, 1933, listed by Torrey, **18**, p. 126, as *C. turgida* f. *scyphifera*) and near Hewitt (*Dillman*, 1934). SUSSEX: Wawayanda Mountain (*Torrey*, 1933). WARREN: Kittatiny Mountain (*Torrey*, 1933).

20a.* CLADONIA SQUAMOSA f. FRONDOSA (Del.) Mass. Lich.

Ital. Exsic. 292b. 1855; *Cenomyce squamosa δ. frondosa* Del. in Duby, Bot. Gall. 625. 1830. WARREN: Kittatiny Mountain (*Torrey*, 1933, det. Sandstede); apparently the first record for North America. The primary squamules in this form are large and pinnately lobed, and the short podetia are densely squamulose.

20b.* CLADONIA SQUAMOSA f. PHYLLOPODA Vainio (6, p. 46). WARREN: Kittatiny Mountain (*Torrey*, 1933, det. Sandstede).

20c. CLADONIA SQUAMOSA f. LEVICORTICATA Sandst. (**4**, p. 435; **12**, *pl. 211, f. 5*, in part). BURLINGTON: East and West Plains (*Lutz*, 1932, see **8**, *p. 12*). OCEAN: near Barnegat (*E. C.* and *G. M. Leonard, 1928*) and Seaside Park (1932).

20ca. CLADONIA SQUAMOSA f. LEVICORTICATA m. PSEUDOCRISPATA Sandst. (**4**, p. 436). BURLINGTON: Bass River State Forest (*Torrey*, 1934), near Chatsworth (*E. C.* and *G. M. Leonard, 1928*), Lower Bank (1932) and West Plains (*Lutz*, 1932, det. Sandstede, see **8**, p. 12). OCEAN: near Barnegat (*E. C.* and *G. M. Leonard, 1928*), near Forked River (*Dillman*, 1934), and Laurelton (*Torrey*, 1934).

20cb. CLADONIA SQUAMOSA f. LEVICORTICATA m. RIGIDA (Del.) Evans (**4**, p. 436; **18**, *pl. 2, f. 5*, in part). Torrey says this is the commonest form in the New Jersey Pine Barrens (see **18**, p. 125). ATLANTIC: Inskip (*Blake*, 1928, det. Robbins). BURLINGTON: Atsion (*Miss Fulford*, 1932), Bass River State Forest (*Torrey*, 1934), Batsto (1932), Brown's Mills (1932), Lower Branch (1932), and West Plains (*Lutz*, 1932, see **8**, p. 13). MORRIS: Green Pond Mountain (*Dillman*, 1933). OCEAN: Bamber Lake (*Dillman*, 1934), near Forked River (*Dillman*, 1934), Hornerstown (*Torrey*, 1933), Lakehurst (*Torrey*, 1934), Seaside Park (1932), Davenport Branch of Tom's River (*Dillman*, 1934), and Wrangel Brook (*Torrey*, 1934). WARREN: Kittatiny Mountain (*Torrey*, 1933). Several of these determinations were made or verified by Sandstede.

20d.* CLADONIA SQUAMOSA f. EPIPHYLLA (Arn.) Sandst. in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 278. 1931. *C. crispata (epiphylla)* Arn. in Rehm, Clad. Exsic. 367. 1889. MONMOUTH: Navesink (*Evans*, 1934, det. Sandstede). OCEAN: near Barnegat (*E. C.* and *G. M. Leonard*, 1928). New to North America. The podetia of *f. epiphylla*, as shown by Sandstede's description, are destitute of squamules, usually cup-forming,

and only 1–7 mm. in height. Except for their small size they bear a resemblance to the podetia of f. *levicorticata* m. *pseudo-crispata*.

21. Cladonia delicata (Ehrh.) Floerke (**4**, p. 438; **18**, *pl. 3*, *f. 1*). On rotten stumps and logs. The New Jersey specimens examined are referable to the following form:—

21a. Cladonia delicata f. quercina (Pers.) Vainio (**4**, p. 439). Bergen: Closter (*Austin*, no date, N. Y., listed in **2**, p. 164, as *C. squamosa* var. *delicata*). Ocean: Bamber Lake (*Dillman*, 1934), Dover Forge (*Dillman*, 1934), and near Forked River (*Dillman*, 1934). Passaic: Franklin Clove (*Torrey*, 1933, see **18**, p. 126) and Green Pond Mountain (*Dillman*, 1934). Sussex: Wawayanda cedar swamp (*Torrey*, 1933, see **18**, p. 126, and also **14**, p. 22).

22. Cladonia caespiticia (Pers.) Floerke (**4**, p. 439; **12**, *pl. 211*, *f. 6;* **18**, *pl. 3*, *f. 5*). On earth and thin soil over rocks. Bergen: Closter (*Austin*, no date, F., N. Y., listed in **2**, p. 164, as *C. squamosa* var. *caespiticia*). Monmouth: Highlands and Navesink (*Evans*, 1934). Sussex: Wawayanda Mountain and cedar swamp (*Torrey*, 1933, see **18**, p. 126). Warren: Kittatiny Mountain (*Torrey*, 1933).

22a.* Cladonia caespiticia f. corticata Sandst. Abhandl. Naturw. Ver. Bremen **25**: 182. 1922 (as modification); in Rabenhorst, Kryptogamen-Flora **9**, Abt. 4^2: 292. 1931 (as form). Ocean: Lakehurst (*Torrey*, 1934, det. Sandstede). New to North America. In the usual forms of *C. caespiticia* the very short podetia are destitute of a cortex and appear translucent; in f. *corticata* a distinct cortex is present, the surface appears opaque, and podetial squamules may be developed.

Group 2. Megaphyllae

23.* Cladonia apodocarpa Robbins (**4**, p. 440; **12**, *pl. 211*, *f. 7*). Bergen: Closter (*Austin*, no date, N. Y., listed in **2**, p. 164, as *C. turgida*). Sussex: Wawayanda Mountain (*Torrey*, 1933). Warren: near Millbrook (*Torrey*, 1934). The related *C. turgida* (Ehrh.) Hoffm. is listed by Austin from Closter and by Eckfeldt (**3**, p. 372) from Blue Mountains, Warren County, as well as from Bergen County. Two of Austin's specimens from Closter are in his collection at the New York Botanical Garden.

These, in the opinion of the writer, represent *C. apodocarpa* and are included in the above list. The Blue Mountain specimens are not in the Eckfeldt collection, and a later record for the species from Passaic County, as shown on page 96, was based on specimens of *C. squamosa*. Under the circumstances it does not seem advisable to consider *C. turgida* a member of the New Jersey flora.

Subsection 3. Clausae

Group 1. Podostelides

24. Cladonia mitrula Tuck. (**4**, p. 444). On earth, often on sandy banks. This species was collected at Closter by Austin as long ago as 1861, and the following records are based on his specimens: **2**, p. 164; **3**, p. 372, in part; **20**, p. 147; **21**, p. 240; and **22**[2], p. 50. Eckfeldt (**3**, p. 372) lists the species also from Camden and Sussex Counties, and Torrey has recently noted its occurrence at Andover (**17**, p. 50). The New Jersey specimens studied by the writer are referable to the following forms:—

24a. Cladonia mitrula f. imbricatula (Nyl.) Vainio (**4**, p. 444; **12**, *pl. 211, f. 8;* **18**, *pl. 3, f. 3*). Bergen: Closter (*Austin*, 1861, 1867, F., N. Y.) and Palisades (*Austin*, 1876). Burlington: near Pemberton (*E. C. and G. M. Leonard, 1928*). Camden: Atco (*Eckfeldt*, 1882, P.). Ocean: New Egypt (*Mr.* and *Mrs. Taylor*, 1932). Passaic: Green Pond Mountain (*Dillman*, 1934). Union: Watchung Reservation (*Torrey*, 1932). Warren: Kittatiny Mountain (*Torrey*, 1932). No specimens from Sussex County are in the Eckfeldt collection.

24b.* Cladonia mitrula f. pallida Robbins (**4**, p. 445). Warren: Kittatiny Mountain (*Torrey*, 1933).

The related species *C. cariosa* (Ach.) Spreng., which has sometimes been confused with *C. mitrula* by North American lichenists, is reported by Austin from Closter (**2**, p. 164) and by Eckfeldt from Bergen and Camden Counties (**3**, p. 372). The Austin collection contains a single New Jersey specimen referred to *C. cariosa*. This specimen is labeled "Palisades, 1876," and, as noted above, represents *C. mitrula* f. *imbricatula*. The specimens from Camden County were collected by Eckfeldt himself, according to his list, but are not represented in his collection. There is, however, a specimen from Atco, Camden

County, collected by Green in 1882 and referred to *C. cariosa.* This specimen has sorediose, cup-forming podetia and is clearly a member of the *C. chlorophaea*-group. There is no convincing evidence, therefore, that the true *C. cariosa* has been found in New Jersey.

25. Cladonia clavulifera Vainio (**4**, p. 446). On earth in fields or on thin soil over rocks. The New Jersey specimens are referable to the following forms:—

25a. Cladonia clavulifera f. nudicaulis Evans (**4**, p. 447; **12**, *pl. 212, f. 1*, in part; **18**, *pl. 3, f. 7*, in part). Burlington: New Gretna (*Musch*, 1928) and West Plains (*Lutz*, 1932, see **8**, p. 13). Ocean: Double Trouble (1932), Lakehurst (*Torrey*, 1934), and Seaside Park (1932). Torrey (**18**, p. 127) lists this form from the Pine Barrens and from Franklin Lake, Passaic County.

25b.* Cladonia clavulifera f. subvestita Robbins (**4**, p. 447; **12**, *pl. 212, f. 1*, in part). Burlington: New Gretna (*Musch*, 1928, det. Robbins). Ocean: Seaside Park (1932).

25c. Cladonia clavulifera f. subfastigiata Robbins (**4**, p. 448). Warren: Kittatiny Mountain (*Torrey*, 1933). Torrey reports this form also from Franklin Lake (**15**, p. 47).

26.* Cladonia subcariosa Nyl. (**4**, p. 449). On earth in fields or on thin soil over rocks. The New Jersey specimens represent the following form:—

26a.* Cladonia subcariosa f. evoluta Vainio (**4**, p. 450; **12**, *pl. 211, f. 9;* **18**, *pl. 3, f. 8*, in part). Bergen: Closter (*Austin*, no date, F.), listed in **2**, p. 164, as *C. pyxidata* var. *symphicarpa* and in **3**, p. 371, as *C. symphicarpa.* Morris: Green Pond Mountain (*Dillman*, 1934). Sussex: Wawayanda Mountain (*Torrey*, 1933). Eckfeldt (**3**, p. 372) lists also *C. symphicarpa* var. *epiphylla* from New Jersey, without citing definite localities, but there are no specimens so named in his collection.

Group 2. Thallostelides

27. Cladonia verticillata (Hoffm.) Schaer. (**4**, p. 458). On earth in fields or on banks. This species is included in Austin's and Eckfeldt's lists under the name "*C. gracilis* var. *verticillata* Fr." (**2**, p. 164; **3**, p. 372). Austin reports it from Closter, and Eckfeldt gives two additional stations: Weehaw-

ken, *Gerard*, and Newfield, *Eckfeldt*. The specimens upon which these records are based have apparently not been preserved; there are no specimens from Weehawken or Newfield in the Eckfeldt collection, and neither of the two New Jersey specimens in the Austin collection is labeled "Closter."

In addition to "var. *verticillata*" Austin lists three other varieties under *C. gracilis*, namely: var. *hybrida* Fr., var. *elongata* Fr., and var. *symphicarpa* Tuck. The first two of these are listed also by Eckfeldt. The third of these varieties is now regarded as a synonym of *C. subcariosa*, but vars. *hybrida* and *elongata* are still included under *C. gracilis* by Vainio, who gives var. *hybrida* as a synonym under *C. gracilis* var. *dilatata* (see **22**^{2}: 88. 1894). Although Eckfeldt gives definite stations for vars. *hybrida* and *elongata*, there are no New Jersey specimens referred to these varieties in his collection. The Austin collection, however, contains a specimen labeled "var. *elongata*" from Closter, although neither the typical form of the species nor var. *hybrida* is represented. The specimen in question should be referred to *C. nemoxyna* (see page 105) and is mixed with immature plants of *C. furcata*. There is no adequate evidence, therefore, that the true *C. gracilis*, as at present defined, occurs in New Jersey.

Austin's New Jersey material of "*C. gracilis* var. *verticillata*," which came from the "Pines of New Jersey," is in poor condition but apparently represents an immature state of *C. calycantha*. This species, in some of its forms, approaches *C. verticillata* very closely, and the line between the two may be difficult to draw. In the writer's opinion, however, the specimens listed below represent the true *C. verticillata*, which seems to be more abundant at higher altitudes than in the Pine Barrens.

27a. CLADONIA VERTICILLATA f. EVOLUTA (Th. Fr.) Stein (**4**, p. 459; **12**, *pl. 212, f. 7*). MORRIS: Green Pond Mountain (*Dillman*, 1934). OCEAN: near Forked River (*Dillman*, 1933). SUSSEX: Wawayanda Mountain (*Torrey*, 1933). WARREN: Kittatiny Mountain (*Torrey*, 1933).

28. CLADONIA CALYCANTHA Del. in Nylander, Flora **38**: 673. 1855 (*nomen nudum*); Ann. Sci. Nat. Bot. IV. **11**: 209. 1859; Syn. Meth. Lich. 192. 1860. In sandy places and on old logs in

cedar swamps. BURLINGTON: East Plains (*Lutz*, 1932, see **8**, p. 13) and West Plains (*Lutz*, 1932; *Evans*, 1932; *Miss Fulford*, 1932). CAMDEN: Atco (*Green*, 1882, N. Y., P., perhaps the material upon which Fink's New Jersey record for *C. verticillata* is based, see **7**, p. 87). OCEAN: near Barnegat (*E. C.* and *G. M. Leonard*, 1928), Double Trouble (1932), Lakehurst (*Torrey*, 1934), Laurelton (*Torrey*, 1934), Seaside Park (1932), and near Whiting's (*Torrey*, 1933). Several of these determinations were made or verified by Sandstede. Torrey has recently reported *C. calycantha* from the Pine Barrens (**18**, p. 128).

The present species was named in manuscript by Delise and listed without description by Nylander in 1855, as noted above. This record was based on specimens collected by W. Lechler in Peru. In the other two citations the species is again listed and is accompanied by very brief comments, hardly sufficient to constitute adequate publication. Vainio, however, gives a detailed description of the species (**22**^{2}, p. 199), together with a long list of stations from Asia, North America, and South America. His most northern station is Miquelon Island, where the plant was found by Delamare; and specimens from this locality were distributed by Arnold (Lich. Exsic. 1149) under the name "*Cladonia cervicornis verticillata* Hoff." Vainio gives no other North American stations for *C. calycantha* north of Mexico and the West Indies, but the species has since been recorded from Florida (see Sandstede **13**, p. 57), as well as from New Jersey.

The podetia of *C. calycantha* agree with those of *C. verticillata* in being cup-forming and in proliferating from the centers of the cups. In distinguishing the species from its immediate allies Nylander emphasized the presence of scattered white spots in the cortex, similar to those found in *C. degenerans* (Floerke) Spreng., but Vainio states that such spots are inconstant. The differential characters drawn from the cups are apparently more satisfactory. In typical *C. verticillata* these expand more gradually than the cups of *C. calycantha*, they are somewhat thicker at the margins, and the latter are subentire or shortly dentate from the presence of sessile apothecia or spermagonia. In *C. calycantha* the margins of the cups are more definitely dentate or even irregularly incised from the presence of stipitate apothecia.

According to Vainio the number of proliferations in *C. calycantha* may be as high as twelve, whereas in *C. verticillata* the number never exceeds six. This distinction, unfortunately, is not of wide application. In many specimens of *C. calycantha* the number of proliferations is fewer than six, in young podetia only a single proliferation may be present, and even this may be rudimentary. Vainio's careful descriptions of the histology of the two species bring out very few differences between them. In the writer's experience, however, the podetial cortex in *C. verticillata* is more continuous and thicker than in *C. calycantha*, being 20–30μ thick in the first and only 10–20μ thick in the second. This difference shows clearly in cross-sections, but further observations will be necessary to prove its constancy.

28a.* CLADONIA CALYCANTHA f. FOLIOSA Vainio, Acta Soc. F. et Fennica **10**: 203. 1894 (**18**, *pl. 4, f. 4*, as *C. calycantha*). BURLINGTON: Speedwell (1932) and West Plains (1932). OCEAN: Bamber Lake (*Dillman*, 1934), near Barnegat (*E. C. and G. M. Leonard*, 1928), Double Trouble (1932), Dover Forge (*Dillman*, 1934), Lakehurst (*Torrey*, 1934), Laurelton (*Torrey*, 1934), Davenport Branch of Tom's River (*Dillman*, 1934), and near Whiting's (*Torrey*, 1933). The podetia in this form are more or less strongly squamulose.

29. CLADONIA PYXIDATA (L.) Hoffm. (**4**, p. 462). On earth in fields and open woods. Austin's list (**2**, p. 164) records *C. pyxidata* from Closter, and Eckfeldt (**3**, p. 372) describes the species as common in New Jersey. The older writers, however, included both esorediose and sorediose forms under the species. Since the latter are now considered specifically distinct, the older records for *C. pyxidata* can be interpreted only by the study of the actual specimens upon which they were based. Unfortunately there are no New Jersey specimens so labeled in either the Austin or the Eckfeldt collections, and those in the Tuckerman collection, six in number, all are sorediose. The writer has seen only one New Jersey specimen, in fact, which is referable to the true *C. pyxidata*. This represents the following form:—

29aa.* CLADONIA PYXIDATA var. NEGLECTA (Floerke) Mass. f. SIMPLEX (Ach.) Harm. (**4**, p. 464; **12**, *pl. 212, f. 3*). WARREN: Kittatiny Mountain (*Torrey*, 1933, det. Sandstede, as *C. pyxidata*).

30. Cladonia chlorophaea (Floerke) Spreng. (**4**, p. 465). On earth in fields and open woods. The sorediose forms which used to be included under *C. pyxidata* are now referred by Sandstede to two closely related species, *C. chlorophaea* and *C. Grayi*, and the writer has pointed out the difficulty of distinguishing between them (**5**, p. 160). Torrey's conception of *C. chlorophaea* (**17**, p. 50; **18**, p. 128) includes both species; but the two are kept apart, at least provisionally, in the present paper. The records for these two species (with two exceptions) are based on Sandstede's determinations. The New Jersey specimens in the Tuckerman Herbarium are not included, since these have not been re-examined. Only one of these, however, the specimen from Closter, is assigned to a definite station; the others are labeled simply "New Jersey." Sandstede refers the following specimens to *C. chlorophaea*:— Ocean: Double Trouble (1932), Lahaway (*Torrey*, 1933), and Seaside Park (1932). These specimens, in part, represent f. *simplex* (Hoffm.) Arn. (see **4**, p. 468). Torrey lists this form from Andover, Sussex County (**17**, p. 50) and, in addition, f. *carpophora* (Floerke) Anders and f. *pterygota* (Floerke) Vainio (see **4**, p. 470).

30a.* Cladonia chlorophaea var. pachyphyllina (Wallr.) Vainio (**4**, p. 472). Warren: Kittatiny Mountain (*Torrey*, 1933, det. Sandstede).

31. Cladonia Grayi Merrill (**5**, p. 159). On earth in fields and open woods. Burlington: New Gretna (*Musch*, 1928, det. Robbins) and West Plains (*Lutz*, 1932, see **8**, p. 13; *Miss Fulford*, 1932; *Evans*, 1932). Monmouth: Navesink (*Evans*, 1934). Ocean: Bamber Lake (*Dillman*, 1934), Double Trouble (1932), Laurelton (*Torrey*, 1934), and New Egypt (1932). Passaic: West Milford (*Torrey*, 1934). These records, with two exceptions, are based on Sandstede's determinations.

32. Cladonia fimbriata (L.) Fr. (**4**, p. 473). On earth in woods or on banks. Austin records *C. fimbriata* and its var. *adspersa* from Closter (**2**, p. 164), and Eckfeldt adds Camden County as a station for the typical form of the species. The older writers understood *C. fimbriata* in a very broad sense, and several of the forms which they included under it are now segregated out as distinct species. The New Jersey specimens upon which Austin's and Eckfeldt's records were based are ref-

erable to two of these segregates, *C. nemoxyna* and *C. coniocraea*, but the following station may be given for *C. fimbriata* in its restricted sense:—OCEAN: Lakehurst (*Torrey*, 1934, det. Sandstede).

33.* CLADONIA NEMOXYNA (Ach.) Nyl. (**4**, p. 475; **18**, *pl. 4, f. 7*, in part). On earth in old fields and on banks. BERGEN: Closter (*Austin*, no date, F., N. Y.; listed by Austin, **2**, p. 164, as *C. fimbriata* in part, as *C. fimbriata* var. *adspersa* in part, and as *C. gracilis* var. *elongata;* and by Eckfeldt, **3**, p. 372, under the same names, except that he substitutes the varietal name *tubaeformis* for *adspersa*) and Crystal Lake (*Dillman*, 1934). PASSAIC: Green Pond Mountain (*Dillman*, 1934). WARREN: Kittatiny Mountain (*Torrey*, 1933).

33a.* CLADONIA NEMOXYNA f. FIBULA (Ach.) Vainio (**4**, p. 477; **18**, *pl. 4, f. 7*, in part). PASSAIC: near Hewitt (*Dillman*, 1934. WARREN: Kittatiny Mountain (*Torrey*, 1933).

34.* CLADONIA OCHROCHLORA Floerke (**6**, p. 55). On logs and banks. WARREN: Kittatiny Mountain (*Torrey*, 1933).

35. CLADONIA CONIOCRAEA (Floerke) Spreng. (**4**, p. 478). On logs and banks; reported by Torrey from Andover, Sussex County (**16**, p. 50). The New Jersey specimens seen by the writer are referable to the following forms:—

35a.* CLADONIA CONIOCRAEA f. CERATODES (Floerke) Dalla Torre & Sarnth. (**4**, p. 479; **12**, *p. 212, f. 5*, in part; **18**, *pl. 4, f. 6*, in part). BERGEN: Closter (*Austin*, no date, F., N. Y.; listed by Austin, **2**, p. 164, as *C. fimbriata* in part and as *C fimbriata* var. *adspersa* in part; and by Eckfeldt, **3**, p. 372, as *C. fimbriata* in part and as *C. fimbriata* var. *tubaeformis*). BURLINGTON: near Pemberton (*E. C.* and *G. M. Leonard*, 1928). CAMDEN: Atco (*Green*, 1882, P.). MONMOUTH: Navesink (*Evans*, 1934). OCEAN: New Egypt (1932) and near Whitings (*Torrey*, 1933). SUSSEX: Wawayanda Mountain, Vernon (*Torrey*, 1933). WARREN: Kittatiny Mountain (*Torrey*, 1933).

35b.* CLADONIA CONIOCRAEA f. TRUNCATA (Floerke) Dalla Torre & Sarnth. (**4**, p. 480; **12**, *pl. 212, f. 5*, in part; **18**, *pl. 4, f. 6*, in part). BERGEN: Closter (*Austin*, no date, F., N. Y., listed by Austin and by Eckfeldt under the names cited above under f. *ceratodes*). CAMDEN: Atco (*Green*, 1882, P.). SUSSEX:

Wawayanda Mountain, Vernon (*Torrey*, 1933). WARREN: Kittatiny Mountain (*Torrey*, 1933).

35c.* CLADONIA CONIOCRAEA f. PYCNOTHELIZA (Nyl.) Vainio (**5**, p. 161). SUSSEX: Wawayanda Mountain, Vernon (*Torrey*, 1933).

36.* CLADONIA BORBONICA (Del) Nyl. (**4**, p. 481). On logs, banks, and thin soil over rocks. Represented by the following form:—

36a.* CLADONIA BORBONICA f. CYLINDRICA Evans (**4**, p. 482). BURLINGTON: Speedwell (1932). PASSAIC: near Hewitt (*Dillman*, 1934). WARREN: Johnsonburg (*Torrey*, 1934) and Kittatiny Mountain (*Torrey*, 1933).

37.* CLADONIA PITYREA (Floerke) Fr. (**4**, p. 483). On earth and old wood. Austin's record for *C. degenerans* (Floerke) Spreng. (**2**, p. 164) was based on material from Closter. This material, according to a specimen in the Tuckerman Herbarium, is not referable to *C. degenerans*, as now defined, but apparently represents *C. pityrea*. Its fragmentary condition, unfortunately, makes a positive determination impossible. Eckfeldt (**3**, p. 372) lists *C. degenerans* from Sussex and Warren Counties, as well as from Bergen County, but there are no New Jersey specimens referred to this species in his collection. For the present, therefore, the occurrence of *C. degenerans* in the State must be considered very doubtful. Even *C. pityrea*, according to the available data, is a rare species in New Jersey, and the writer is able to list only one specimen of recent collection, as follows:—

37a.* CLADONIA PITYREA var. ZWACKHII Vainio f. SUBACUTA Vainio (**4**, p. 485). OCEAN: New Egypt (*Mrs. Anderson*, 1932).

Group 3. FOLIOSAE

38. CLADONIA STREPSILIS (Ach.) Vainio (**4**, p. 487). On earth in fields and open woods. BURLINGTON: West Plains (*Lutz*, 1932, see **8**, p. 13). The species is listed by Torrey from the Pine Barrens (**18**, p. 129) under several forms.

38a. CLADONIA STREPSILIS f. GLABRATA Vainio (**4**, p. 488; **18**, *pl. 3, f. 4*, in part). BURLINGTON: East and West Plains (*Lutz*, 1932, see **8**, p. 13) and Lower Bank (1932).

38b. CLADONIA STREPSILIS f. CORALLOIDEA (Ach.) Vainio (**4**, p. 489; **12**, *pl. 212, f. 10;* **18**, *pl. 3, f. 4*, in part). BURLINGTON:

West Plains (*Lutz*, 1932, see **8**, p. 13) and Lower Bank (1932).

38c. Cladonia strepsilis f. subsessilis Vainio (**4**, p. 489; **18**, *pl. 3, f. 4*, in part). Burlington: near Chatsworth (*E. C. & G. M. Leonard*, 1928) and East Plains (*Lutz*, 1932, see **8**, p. 13).

38d.* Cladonia strepsilis f. compacta Anders (**5**, p. 163). Ocean: Hornerstown (*Torrey*, 1933, det. Sandstede).

Group 4. Ochroleucae

39. Cladonia piedmontensis Merrill (**4**, p. 490; **11**, *pl. 187;* **12**, *pl. 212, f. 11*). On rich soil in fields and open woods. This species is listed from Closter by Austin (**2**, p. 164), under the name *C. lepidota*, and from Bergen and Salem Counties by Eckfeldt (**3**, p. 372), under the same name. Austin's specimens of "*C. lepidota*" are labeled simply "New Jersey." These specimens were examined by Robbins (**10**, p. 103) and referred, at least by implication, to the two forms listed below. There are no New Jersey specimens labeled *C. lepidota* in the Eckfeldt collection. The true *C. lepidota* Nyl., as defined by recent writers, is a northern species related to *C. degenerans*.

39a. Cladonia piedmontensis f. lepidifera (Vainio) Robbins (**4**, p. 491; **11**, *pl. 187, f. 14–18;* **12**, *pl. 212, f. 11*, in part). Bergen: Closter (*Austin*, 1860, F., N. Y., det. Robbins). Although these specimens are not actually labeled "Closter," they probably represent the material cited by Austin and by Eckfeldt (under Bergen County), as well as by Tuckerman (**20**, p. 148; **21**, p. 250) and by Vainio (**22**[2], p. 420). Ocean: Laurelton (*Torrey*, 1934).

39b. Cladonia piedmontensis f. intermedia Robbins, Rhodora **31**: 104. *pl. 187, f. 8-10*. 1929. Bergen: Closter (*Austin*, 1860, F., det. Robbins, mixed with the material cited under the preceding form). In f. *intermedia* both large and small apothecia are produced, and the podetia are smooth or nearly so.

39.* Cladonia piedmontensis f. squamulosa Robbins (**4**, p. 491; **11**, *pl. 187, f. 14-18*). Ocean: Laurelton (*Torrey*, 1934).

Excluded species

The ten species enumerated below, which are recorded from New Jersey by Eckfeldt and (in most cases) by Austin, are not included in the preceding list. In some cases they appear under

different names, but in other cases the specimens upon which the records were based are either inconclusive or unavailable.

1. *C. alpestris* (reported as *C. rangiferina* var. *alpestris*);
2. *C. cariosa* (see *C. mitrula* f. *imbricatula*);
3. *C. cornucopioides* (see *C. pleurota*);
4. *C. cornuta;*
5. *C. degenerans* (see *C. pityrea*);
6. *C. gracilis* (see *C. verticillata* f. *evoluta*);
7. *C. leporina*;
8. *C. lepidota* (see *C. piedmontensis*);
9. *C. symphicarpa* (see *C. subcariosa* f. *evoluta*);
10. *C. turgida* (see *C. apodocarpa*).

Such species as *C. alpestris*, *C. cariosa*, *C. cornuta*, *C. degenerans*, *C. gracilis*, *C. lepidota*, and *C. turgida* are predominantly northern in their distribution and would hardly be expected in New Jersey, although one or two of them have been found in the higher Alleghanies. Such a species as *C. leporina*, on the other hand, which has a southern range, might well be expected.

Literature cited

1. **Blake, S. F.** *Cladonia floridana* in New Jersey. Rhodora **31**: 56. 1929.

2. **Britton, N. L.** A preliminary catalogue of the flora of New Jersey. Geological Survey of New Jersey, xi, 233. New Brunswick, 1881.

3. ———. Catalogue of plants found in New Jersey. Final Rept. State Geologist **2**: 27–649. 1889.

4. **Evans, A. W.** The *Cladoniae* of Connecticut. Trans. Connecticut Acad. **30**: 357–510. 1930.

5. ———. Notes on the *Cladoniae* of Connecticut. Rhodora **34**: 121–142, 153–164. 1932.

6. ———. Notes on the *Cladoniae* of Connecticut. II. Rhodora **37**: 33–57. 1935.

7. **Fink, B.** Further notes on Cladonias.—IV. Bryologist **7**: 85–88. pl. 11. 1904.

8. **Lutz, H. J.** Ecological relations in the Pitch Pine Plains of Southern New Jersey. Yale University, School of Forestry, Bull. 38. ix, 80, *18 figs*. New Haven, 1934.

9. **Merrill, G. K.** Lichen notes No. 12. The *Cladonia* specimens of "Lichenes Boreali-Americani." Bryologist **12:** 90–94. 1909.

10. **Robbins, C. A.** The identity of *Cladonia Beaumontii*. Rhodora **29:** 133–138. *pl. 157*. 1927.

11. ———. The identity of *Cladonia lepidota* Fries. Rhodora **31:** 101–106. *pl. 187*. 1929.

12. **Robbins, C. A., & Blake, S. F.** *Cladonia* in the District of Columbia and vicinity. Rhodora **33:** 145–159. *pl. 210–212*. 1931.

13. **Sandstede, H.** *Cladoniae* exsiccatae. Berichtigte Uebersicht. 1–66. Westerstede, 1930.

14. **Thompson, J. W., Jr.** Field trip of December 10 [1933]. Torreya **34:** 21–22. 1934.

15. **Torrey, R. H.** Lichen observations on winter walks of the Club. Torreya **32:** 45–47. 1932.

16. ———. Unusual lichen occurrences. Torreya **32:** 166–167. 1932.

17. ———. Lichen excursion at Andover, New Jersey. Torreya **33:** 49–50. 1933.

18. ———. *Cladoniae* in the range of the Torrey Botanical Club. Torreya **33:** 109–129. *pl. 1–4*. 1933.

19. ———. Swamp survivals near Moonachie, New Jersey. Torreya **33:** 130–132. 1933.

20. **Tuckerman, E.** Genera Lichenum: an arrangement of the North American lichens. xv, 283. Amherst, 1872.

21. ———. A synopsis of the North American lichens: Part I, comprising the *Parmeliacei*, *Cladoniei*, and *Coenogoniei*. xx, 262. Boston, 1882.

22. **Vainio, E.** Monographia *Cladoniarum* universalis. Pars prima. Acta Soc. F. et Fl. Fennica **4:** 1–510. 1887. Pars secunda. *Ibid.* **10:** 1–499. 1894. Pars tertia *Ibid.* **14:** 1–268. 1897.

YALE UNIVERSITY
NEW HAVEN, CONNECTICUT

Paraphenylenediamine, a new color test for lichens

Raymond H. Torrey

Dr. Alexander W. Evans, of the Osborn Botanical Laboratory at Yale University, has informed me of a new color test for the genus Cladonia, which promises an interesting re-survey of the reactions of its many species. He learned of it from Dr. Heinrich Sandstede, of Germany, who reports that it was discovered by a Japanese botanist, Asahina. The reagent is called Paraphenylenediamine, or Paradiaminobenzine.

Hitherto a solution of KOH, potassium hydroxide or caustic potash, has been the reagent for determining the presence of relatively large amounts of the bitter tasting fumarprotocetraric acid in lichens, and has been satisfactory in giving color reactions in many species, which are helpful in separating them from other species of somewhat similar appearance to the unaided eye or the hand lens. These reactions are described in Lindau's "Die Flechten für Anfanger," which a number of members of the Torrey Botanical Club are now using for its excellent plates; in Annie Lorain Smith's "Manual of British Lichens," and in Dr. Evans "Report on the Cladoniae of Connecticut," and I have followed these authorities in citing such reactions in papers on the Cladoniae of our range and of the North Woods, published in Torreya.

But German botanists, especially Dr. Sandstede, have named a number of species and forms on the basis of their taste to the human tongue, whether bitter because of a relatively large amount of fumarprotocetraric acid, or mild because without it. Now, with the use of paraphenylenediamine, says Dr. Evans, "it will no longer be necessary to taste our specimens." His letter continues:

"This is a crystalline substance, soluble in alcohol, and is applied by means of a medicine dropper to the dry plant. If fumarprotocetraric acid is present a yellow color quickly appears and the color deepens to an orange, orange red, or brick red as the alcohol evaporates. If the bitter acid is not present, the reaction is wholly negative or a pale and permanent yellow stain results. Dr. Sandstede recommends that a small amount of the reagent be dissolved in a watch-glass and tested in such a very bitter species as *C. coniocraea* to see if the solution is

strong enough. If it gives a reaction with this, it is all right. The solution must be freshly prepared, since it rapidly deteriorates, but the same solution can be used for many tests. If the bitter *C. tenuis* and the mild *C. mitis* are placed side by side and tested, the contrast between the two is brought out very vividly. I have applied the reagent to the various specimens referred to *C. Grayi* and have obtained a negative result every time."

Dr. Evans' reference to *C. Grayi* is interesting, for it concerns forms of cupped Cladoniae, which, to the naked eye and hand lens appear much the same. In my papers, I used *C. chlorophaea*, for the species, with the forms described by Dr. Evans in his Connecticut Report. But in additional notes on the Connecticut species, in Rhodora, as cited in my papers, Dr. Evans notes that Dr. Sandstede makes some of these cupped forms *C. Grayi*, basing them on material sent to him, from North Carolina, by Rev. Fred. W. Gray, of Philippi, West Va., for whom Dr. Sandstede named the species. *C. Grayi*, according to Sandstede, is mild to the taste, and he names it as a separate species for that reason but no morphological distinction is described. Similar cupped Cladoniae, with brown apothecia when fertile, in the Group Thallostelides, which are bitter, may presumably be left in *C. chlorophaea*, although I have not obtained definite advice on that yet from Dr. Evans. *C. Grayi* may be simple, outwardly resembling what I have called, following Dr. Evans' report, *C. chlorophaea, f. simplex*, or with branches from the rims bearing brown apothecia, like *C. chlorophaea, f. carpophora*.

I have obtained some of the paraphenylenediamine and am trying it out, with surprising results, which will lead to a complete re-test of all the Cladonia species and forms in my collections to see what happens to them under this new and powerful reagent. On *C. coniocraea*, which gives a brown reaction, sometimes but slowly, with KOH, the yellow, orange red and brick red colors appear, as Dr. Evans says. I got a brick red reaction in *C. verticillata*, which gives no or only a slight brown reaction with KOH, and the same happened with *C. calycantha*. *C. santensis*, which reacts yellow with KOH, does the same with P— (we will have to find a shorter name for it.) I tried some of the cupped Cladoniae and in some got no reaction, and in others a

brick red; presumably the first are *C. Grayi* and the second *C. chlorophaea.*

As Dr. Evans suggests, the test will be interesting as between species of the subgenus Cladina, the "Reindeer Mosses," some of which look much alike to the naked eye. I have just begun the retesting of my attic full of collections, but I hasten to inform other members of the Torrey Botanical club of this new reagent so that they may have the pleasure of trying it as well. Future lichen floras will have to include references to the test with paraphenylenediamine as well as KOH.

Hollis, Long Island, N. Y.

PROCEEDINGS OF THE CLUB

Meeting of April 17, 1935

The meeting of the above date was held at the Brooklyn Botanic Garden and was called to order by President Hazen at 3:40 P. M. The minutes of the meetings of March 20 and April 2 were read and approved. Fourteen members were present. The following persons were elected to full membership: Mr. K. D. Doak, University of Pennsylvania, Philadelphia, Pa.; Dr. Georg Cafondontis, Via Acquarone 3 7. Genoa, Italy; Mr. Wm. C. Brumbach, 2610 Cumberland Avenue, Mt. Penn, Pa.

Notice of the change of status of the following, who have signified their desire to become field members, was also given: Mr. Charles Greenberg, 924 Kelley Street, N. Y. C.; Miss Frieda Lichtman, 395 Riverside Drive, N. Y. C.; Miss Alice Halsey, Garrison, N. Y.

The scientific part of the program consisted of a talk by Dr. H. K. Svenson, Curator of the Herbarium, Brooklyn Botanic Garden, entitled The Bidens Problem in Eastern New York. This was followed by an inspection of the Local Floral Area of the Brooklyn Botanic Garden.

Arthur H. Graves
Secretary pro tem.

Meeting of May 7, 1935

The meeting of the Torrey Botanical Club was held at the American Museum of Natural History on the above date and was called to order by President Hazen at 8:15 P. M. There were thirteen people present.

The meeting of the second week of May was postponed to May 29th at 3:30 P. M. at The New York Botanical Garden.

Dr. Forman T. McLean, Supervisor of Public Education at The New York Botanical Garden gave a talk on "Plant Life of South Africa." This talk was illustrated by lantern slides.

Forman T. McLean
Secretary

NEWS NOTES

Dr. Elmer D. Merrill, director of the New York Botanical Garden for the past five years, has accepted the position of head of the Harvard University botanical units. The appointment is regarded as one of the most important ever made in the field of botany in the United States. The eight units Dr. Merrill will be in charge of are the Gray Herbarium at Cambridge, the Farlow Herbarium and library, the Arnold Arboretum at Jamaica Plains, Mass., the tropical botanical garden at Cienfuegos, Cuba, the Harvard Forest for research work at Petersham, Mass., the Bussey Institution for botanical research at Forest Hills, Mass., and the Botanic Garden and Botanical Museum at Cambridge, celebrated for its collection of glass flowers. Before coming to New York to succeed Dr. Britton as the second director of the Botanical Garden, Dr. Merrill was for six years dean of the University of California College of Agriculture and director of the California Botanical Garden. Previously he had spent twenty years in the Philippines being director of the Bureau of Science there from 1919 to 1923. Dr. Merrill is known as an authority on the plants of China and the Philippines and has described over 3000 new species from these regions.

Dr. L. H. Bailey has given to Cornell University his herbarium and library which will be known as the Liberty Hyde Bailey Hortorium. The herbarium consists of some 125,000 mounted sheets especially rich in cultivated plants and including type specimens of various palms and species of Carex, Vitis, Rubus and other genera. A full time curator will be appointed by the university to care for the hortorium. One or more graduate fellowships, to be known as the Liberty Hyde Bailey Botanical Fellowships, will be established.

The Brooklyn Botanic Garden reports that the attendance during May was over a quarter of a million, the largest monthly attendance in the history of the Garden.

The New York Botanical Garden in cooperation with the New York Bird and Tree Club is to establish a bird sanctuary in the woodland of the Garden. A nine-acre tract will be enclosed and only people with "a sincere interest in wild life" will be admitted to this region, where it is expected many birds

will find nesting sites. Mrs. William Wallace Nichols is chairman of the sanctuary committee which is making appeals for funds to complete the project this fall. About $3,500 will be needed of which one third has been contributed to date.

Professor Friedrich August Went died at The Hague on July 25th at the age of seventy-two. Professor Went had done important work in tropical agriculture in Java, and Dutch Guiana. In addition to his services to agriculture, Professor Went established a biological physiological institute at Utrecht.

On Tuesday, June 11, the Brooklyn Botanic Garden celebrated its eighth annual Rose Garden Day. Mr. Charles H. Totty gave an interesting talk on "How to grow roses." Following a tour of the Rose Garden, where more than 3,000 plants in about 300 varieties are growing, tea was served in the rotunda of the laboratory building by members of the Woman's Auxiliary of the Garden.

Dr. Harold St. John, professor of botany at the University of Hawaii is spending the summer and fall studying at Harvard University and visiting the herbaria in various European cities. Dr. O. N. Allen will act as head of the botanical department of the university during Dr. St. John's absence.

The National Research Council has made a grant to Dr. A. B. Stout of the New York Botanical Garden for travel expenses and technical assistance in connection with his study of seedlessness in grapes.

Dr. Marshall A. Howe has been elected director of the New York Botanical Garden to succeed Dr. Merrill when he leaves on October 1. Dr. Howe has been a member of the scientific staff of the museum since 1901 and assistant director since 1923. He is an authority on marine algae and has specialized in the cultivation of dahlias, irises and peonies. The dahlia border at the garden which attracts thousands of visitors every fall has been under his direction since its formation. Dr. Howe was the first editor of Torreya. He has also been editor of the Bulletin of the Torreya Botanical Club and of the Journal of the New York Botanical Garden.

Mr. Henry de la Montague Jr., the present business manager and assistant treasurer of the garden, will become assistant director to succeed Dr. Howe. Dr. H. A. Gleason will become deputy director, but will retain his present title of head curator.

Dr. E. D. Merrill has sailed for Europe to attend the 6th International Botanical Congress at Amsterdam from September 2 to 7. He is chairman of the official American delegation and president of the section on taxonomy and nomenclature.

Dr. Benjamin Lincoln Robinson, Asa Gray professor of botany at Harvard University since 1899, died at Jaffrey, New Hampshire on July 27. He was appointed an assistant in the Gray Herbarium in 1890, two years later he became curator, a position he held after he was made professor and placed in charge of the botany department. He resigned in March of this year on reaching the age of 70 and was made professor emeritus. Dr. Robinson was editor of Rhodora, the journal of the New England Botanical Club, from 1899 till 1928. He edited the seventh edition of Gray's Manual of Botany and was the author of many botanical papers.

The American Museum of Natural History has sent a scientific expedition consisting of Mr. Suydam Cutting and Mr. Arthur S. Vernay to Tibet to collect anthropological material for the museum and botanical specimens for the Botanical Garden. Thee xpedition is the result of five years of negotiations with the Grand Lama. Out of respect for Buddist traditions no animals will be collected.

Dr. G. W. Martin, professor of botany in the University of Iowa, and Dr. R. E. Woodson, of the Missouri Botanical Garden, have sailed to the Panama Canal Zone. They will explore sections of the island and mountain areas of the Canal Zone and Panama and the Santa Marta Mountains of Columbia. They will collect especially Myxomycetes and Basidiomycetes.

THE TORREY BOTANICAL CLUB

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BY
GEORGE T. HASTINGS

John Torrey, 1796-1873

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GEORGE T. HASTINGS
2587 Sedgwick Ave.,
New York, New York

TORREYA

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Plants from the estuary of the Hudson River

Henry K. Svenson

Early in the fall of 1933 Mr. Max Elwert brought me specimens of *Plantago cordata* Lam. collected in the Hudson River at Red Hook, Dutchess County, with some photographs of the habitat of this remarkable species.

Plantago cordata is primarily a plant of the Mississippi valley and the Great Lakes region, its only record from the New York area, according to Taylor (Fl. Vic. N. Y. 568, 1915), being "an old collection made at Mattewan, New York, many years ago." Torrey (Fl. N. Y. **2**: 15. 1843) however, cites it from "Manhattanville on the Island of New York, and near Fishkill in Dutchess County." Mr. Elwert first took me to the south bay of Crueger Island on September 21, 1933, where a number of plants grew on a protected gravel beach. This colony was said to be small in comparison with the hundreds of plants to be seen at Stony Creek, about a mile to the northward, and a later visit to this interesting locality showed large plants and innumerable seedlings covering the rocky shores where they were submerged at high tide level. *Plantago cordata* has the outward appearance of a robust *P. major*, but is easily differentiated by the thick fleshy roots and the attractive appearance of the purplish flowering spikes which appear in the spring. Mr. Elwert and I again visited Rocky Creek on October 11, 1934, fortified this time by a pair of rubber boots, and despite the damage of early frosts we found the *Plantago* and many other interesting plants of the tidal shores in good condition. *Plantago cordata* was also collected by me at Catskill, Greene County, in 1934 (*Svenson* no. 6275). Like *Samolus floribundus* and several other species of wide distribution in the interior, *Plantago cordata* is evidently a strictly estuarine plant at the northeastern limit

of its range, but it appears to occupy a zone much higher than the other estuarine plants.

ISOETES RIPARIA Engelm. Plants of *Isoetes* (nos. 6108, 6437), which clearly belong to the *I. saccharata-I. riparia* complex, were found sparingly in the tidal mud on both visits. A rather poor specimen of the earlier collection (no. 6108) was submitted

Plantago cordata

to the late T. Chalkley Palmer who said that its identity could not be certain, but that it was almost certainly not *I. Eatoni* which it resembled in spore characters, and that he could not call it *I. saccharata*, and that similar semiabortive spores (measuring 376–423μ) were found in young or spindly *I. riparia*. The plants (no. 6437) were of moderate size (leaves 10–15 cm. long) with strongly bilobed dark corms, and megasporangia in which the spores averaged 400μ in diameter. The markings consisted of close-set high jagged crests, which appeared identical with

those in a collection of *I. riparia* by Commons at Newcastle, Delaware (specimen in herb. Brooklyn Botanic Garden), with traces here and there of a fine reticulum. The megaspores were also a good match for the illustration of *I. riparia* by Clute.[1] Through the kindness of Dr. Pennell, I examined several sheets (from the herbarium of the Philadelphia Academy of Sciences) of *I. saccharata* from the Delaware region, named by Palmer. These have megaspores with low crests conforming to the accepted characterization of *I. saccharata*. The question of specific differentiation between *I. saccharata* and *I. riparia* remains as indefinite as it was when Shull[2] discussed the problem, but the Red Hook material apparently belongs with the deep-crested phase known as *I. riparia*. The only species of *Isoetes* previously recorded from the Hudson River appears to be *I. Engelmanni* (Pfeiffer, Ann. Missouri Bot. Garden, **9:** 204. 1922). Dr. Gleason has kindly lent me the material at the New York Botanical Garden representing the collection by LeRoy in 1868 from tidal shores at Peekskill, but this collection has megaspores in too young a stage to arrive at any definite conclusion as to the species. The occurrence of *Isoetes riparia* was to be expected in New York, since it has been recorded from New England and from the Delaware and Passaic Rivers (Pfeiffer, l.c. p. 182).

ERIOCAULON PARKERI Robinson. This species, easily recognized by the small blackish heads, occurred sparingly on the tidal shores (no. 6463). It is confined to river estuaries from Maine to Virginia (cf. Fassett, Proc. Boston Soc. Nat. Hist. **39:** 99. 1928) and its occurrence at Stony Creek makes the plant a new record for New York.

POLYGONUM SAGITTATUM f. CHLORANTHUM Fernald, (Rhodora **19:** 134. 1917). The green-flowered form was described from the tidal mud-flats at Bowdoinham, Maine, but it is also common, according to Fassett (l.c., p. 107), on the estuaries of the Merrimac and Connecticut Rivers. It is ordinarily submerged at high tide, and in the specimens collected by us at Stony Creek (no. 6444) was characterized by a conspicuous large petal-like calyx which reached a length of 4.5 and even 5 mm. The calyx of the common pink form averages 3.7 mm. and in no speci-

[1] The Fern Allies, New York 1905 (p. 239).

[2] Bot. Gazette **36:** 200. 1903.

mens examined did it approach the estuarine material in size. The ripe fruit (3.0×2.0 mm.) is the same size as in typical *P. sagittatum*. Fassett has noted (l.c.) that the green-flowered form is found elsewhere than on estuaries. I have found it rather common in the late fall on Long Island where it has flowers of normal size.

PENTHORUM SEDOIDES L. f. **leucosperma,** n. var., a forma typica recedit seminibus albis. The seeds of *P. sedoides* are ordinarily deep brown, but in the sprawling plants (no. 6434, TYPE in herb. Brooklyn Botanic Garden), obtained between high and low tide levels at Stony Brook, the seeds are white or cream colored, only the axis to which they are attached showing any orange-brown coloration. These specimens have a greatly reduced green inflorescence which does not show the brownish color of pistils and filaments ordinarily seen in the typical plants.

LUDVIGIA PALUSTRIS (L.) Elliott var. **inundata** n. var.—Caulo plerumque simplice elongato crassoque fructigero, foliis viridibus, seminis 0.7–0.8 mm. longis, albis vel leviter stramineis. Differt a planta typica caulibus elongatis viridibus et seminibus majoribus albidis.

Differs from typical *L. palustris* in the rather thick simple elongated stems, wholly green color, and larger whitish seeds. Submerged on shores of tidal streams, New York to Maryland. NEW YORK: tidal mud of Rocky Creek, Red Hook, Dutchess County, *M. E. Elwert* and *H. K. Svenson* no. 6446 (TYPE in herb. Brooklyn Botanic Garden); tidal shores of Hudson River, Coeymans, Albany County, *Svenson* no. 5496 (seeds 0.7 mm. long). NEW JERSEY: Taylor, Burlington County, *H. B. Meredith* (seeds whitish to straw-colored, 0.76 mm. long); Camden, *C. H. Brice* (seeds straw-colored, 0.8 mm. long); shores of Delaware River, Burlington County, *Bayard Long* (seeds white, 0.75 mm. long). PENNSYLVANIA: shores of Delaware River, Delair County, *Bayard Long* (seeds white, 0.76 mm. long). MARYLAND: tidal shores, Elkton, *Svenson* no. 3479 (seeds 0.77 mm. long).

The *Ludvigia* collected on the tidal shores at Rocky Creek had an appearance strikingly different from the reddish sprawling plant commonly seen in ditches and on pond shores, the plants being entirely green with leaves confined for the most

part to the ends of the long unbranched stem, the numerous fruits remaining conspicuously on the leafless parts. It is assumed that the stems become more or less erect during high water, with the cluster of leaves reaching nearly or quite to the surface. The fruits appear somewhat thicker than usual in *L. palustris* and contain large white to straw-colored seeds (averaging 0.7–0.8 mm. long[3]); the cinnamon-colored to brown seeds of the plants of northern United States and of Europe run from 0.5–0.65 mm. and very rarely 0.7 mm. in length. Most of the estuarine plants were exceptionally robust, the stems exceeding 3 dm. in length, but even minute plants only a few centimeters high had seeds 0.7 mm. long. The flowers were minute even for this species with extremely small flowers, a reduction undoubtedly paralleling that in other estuarine plants, for example *Ilysanthes dubia* var. *inundata*.

This material was strikingly similar to previous collections made by me at Coeymans on the opposite shore of the Hudson River, 1932, and from Chesapeake Bay, and this fact suggested that the same type of plant ought to occur in the estuary of the Delaware River. Through the kindness of Dr. Pennell, I have examined specimens from the herbarium of the Philadelphia Academy of Natural Sciences and it is from this material that I have cited stations for var. *inundata* from New Jersey and Pennsylvania.

It is obvious that this variety is not the same as *L. palustris* (L.) Ell. f. *submersa* (Gluck) E. H. Eames (Rhodora **35**: 229. 1933) which was a renaming of the sterile branched deepwater form of Europe. I do not believe that it can be associated with the poorly defined *Isnardia palustris β americana* DC. (Prod. **3**: 61. 1828) differentiated only by "foliis untrinque magis acuminatis" and based primarily upon plants from southern United States.

Although small purplish rudimentary petals were reported in *Ludvigia palustris* by Torrey (Fl. N. Y. **1**: 238. 1843) and have been mentioned by subsequent writers, no sign of such structures, with a single exception, has been observed by me in examination of a large amount of material. In a collection of *L. palustris* by *E. J. Palmer* (no. 12235) from Kerr County, Texas, four

[3] Average measurements were obtained from ten seeds.

whitish petals up to 2 mm. in length with much narrowed base, were inserted alternately with the four glandular structures which Meehan (Proc. Phila. Acad. Nat. Sci. **51**: 95. 1899) considered, probably incorrectly, as representing modified petals. Palmer's collection has plump rounded seeds and should perhaps be identified with *L. natans* Ell.

The name *Isnardia ascendens* Hall in Eaton, Man. N. Amer. Bot. ed. **7**: 353. 1836, is of importance, especially since the species came from Albany. It was described as having a "stem obliquely ascending, rigid, (never creeping or prostrate) somewhat angular, reddish, grows with the *palustris*, but is generally smaller and quite different in appearance." This description seems to have had its origin from Wright and Hall (Plants Vic. Troy, 22. 1836) where *Isnardia palustris* has the notation, "A variety of this or another species, with an ascending, rigid stem, flowering in August, grows 3 miles west of Albany." This last citation might well place *Isnardia ascendens* at the site of the station for *Ammannia humilis* Michx. [*Rotala ramosior* (L.) Koehne] given by Paine (Cat. Pl. Oneida Co. 134. 1865): "Around sandy pools and banks of rivulets in the Pine barrens between Albany and Schenectady, near the Central railroad and Centre station. Rare. July, August." *Ludvigia palustris* and *Rotala ramosior* often have a strong superficial resemblance and the description of *Rotala* in Britton & Brown (Illus. Fl. ed. 2, **2**: 579. 1913), "4-angled stems . . . ascending or erect" corresponds in some respects to the stated characteristics of *Isnardia ascendens*. Until Hall's specimen can be located, no definite judgment can be passed. Dr. H. D. House, in response to my inquiry, has written that the type of *I. ascendens* has not been located, and that the fate of Hall's herbarium is unknown. In whatever way the name *Isnardia ascendens* may be disposed of, it is apparent that it does not apply to the estuarine variety of *Ludvigia palustris*.

A collection issued by me as *Rotala ramosior* from Hollow Rock, Tennessee (*Svenson* no. 4386) differs from all other specimens I have seen, in possessing a remarkable woody rootstock 3 mm. thick. In this specimen the white seeds average 0.65 mm., but the small leaves and arcuate branches place it closer to the slender southern phase of *L. palustris* (*L. nitida* Michx.

Fl. Bor. Am. 1: 87. 1803), which has seeds 0.4-0.65 mm. long, varying from brown to whitish.

Limosella subulata Ives (cf. Fassett, l.c., p. 105). This diminutive species of the Scrophulariaceae is more tolerant of saline conditions than the other estuarine species found at Rocky Creek, where it was associated sparingly (no. 6442) with *Isoetes riparia* and *Eriocaulon Parkeri*. It is known from several stations on Long Island and has been previously recorded from as far north as Peekskill on the Hudson River (House, N. Y. State Mus. Bull. 254: 623. 1924).

Hemianthus micranthus (Pursh) Pennell (*Micranthemum micranthemoides* (Nutt.) Wettst. Known previously only from the tidal flats of the lower Delaware River and southward, occupying with *Heteranthera reniformis* the tiny pools left by the receding tide (no. 6109). On our second visit only fragmentary material was observed, and it was obvious that the plants had suffered severely from frost.

Ilysanthes dubia (L.) Barnhart var. inundata Pennell, Torreya 19: 149. 1919. No specimens of *Ilysanthes* were collected at Stony Creek, but the plants of the submerged shores are undoubtedly the same as material obtained at Coeymans (*Svenson* no. 5495) on the opposite shore of the Hudson River. The variety has previously been known from the Passaic River to the Potomac River, and is cleistogamous (Pennell, Bartonia 8: 10. 1924). In no. 5495 the corollas are rudimentary, not exceeding 2 mm., whereas in typical *I. dubia* they are 5–10 mm. long.

Bidens hyperborea Greene. This estuarine species, composed of several geographic variants, extends southward from Hudson Bay to northeastern Massachusetts, and according to Fassett (l.c. p. 104) is known from a single collection (1827) from the Hackensack marshes of New Jersey. This is the first occurrence in New York State. At Rocky Creek, *B. hyperborea* was accompanied by *B. laevis*, *B. frondosa* var. *anomala*, *B. bidentoides* and *B. Eatoni* var. *major*, all of which are common on tidal shores of the Hudson River from Albany to Peekskill. Both *E. connata* and *E. Eatoni* var. *major* are represented in the numerous collections which I have made over a period of years from the Hudson estuary, by forms with downward, upward, and intermediately barbed achenes.

The foregoing treatment of unusual items gives no conception of the almost tropical richness of vegetation along the upper tidal reaches of the Hudson River. The broad expanse of quiet water supports great stands of *Typha latifolia*, and *Scirpus validus*. With these are mingled wild rice (*Zizania aquatica*) and enormous masses of the cow lily (*Nymphozanthus advena*), here reaching its northeastern limit except for an isolated station at the mouth of the Kennebec River. The golden club (*Orontium aquaticum*) is abundant and achieves a surprising development. The small tidal tributaries, such as Stony Creek, are choked by masses of *Vallisneria americana*, *Anacharis occidentalis*, *Heteranthera graminea*, *Myriophyllum humile* (no. 6430) and *Potamogeton Spirillus*, and I have collected the rarer *P. Vaseyi* (no. 6274) and *P. zosterifolius* (no. 6271) at the mouth of the Catskill on the opposite shore of the Hudson River. The margins of these small streams are frequently lined with *Sagittaria heterophylla*, and submerged in quiet places is usually an abundance of *Lemna trisulca*.

Turf often occupies the shores at the high-tide limit where the submergence is not so prolonged and here among other plants at Stony Creek grew *Juncus brachycephalus* (no. 6439, determined by F. J. Hermann), *J. Dudleyi* (no. 6027), and *Mentha arvensis* var. *glabrata* (no. 6429). The asters which occupy the submerged zone are *A. lateriflorus* var. *hirsuticaulis* (no. 6027), *A. pilosus* Willd. var. *demotus* Blake (*A. ericoides* of Gray Man. ed. 7) (no. 6112) which is greatly dwarfed, and *A. puniceus* L. var. *firmus* T. & G. (no. 6431). The last, represented by narrow unbranched plants, flowers when only 4–5 dm. high.

Above the influence of the tide and occupying the clayey banks were a number of species of interest, among them the indigenous *Physostegia virginiana* (nos. 6113, 6432) which according to House, (l.c. p. 597) is "infrequent or rare from Lake Champlain and Oneida County southward and westward." Occasional on these banks but becoming abundant in nearby alder thickets, was the true *Gentiana Andrewsii* (cf. Fernald, Rhodora **19**: 147. 1917) which has the appearance of *G. Saponaria* but is easily recognized by the corolla fringes which project from the narrowed apex of the flower. *G. Andrewsii* is chiefly a western species, which has been confused with *G. clausa*, the common species of the New England uplands. *Pedicularis lanceolata* ap-

peared just above the high tide level and on the rocky slopes Mr. Elwert had found clumps of the fragrant sumach, *Rhus canadensis*, a species of sufficient rarity in eastern New York to receive attention. Although Taylor (l.c. p. 429) cites it only from a single station (Guilford, Conn.) in the New York area, it is noted by House (l.c. p. 476) as "locally common from Lake Champlain south to the Hudson highlands." I had previously seen *Rhus canadensis* growing abundantly on a rocky headland projecting into the Hudson River at Malden, Ulster County.

It is evident from these foregoing records of interesting plants, a number of them new to New York State, that this rich area has been insufficiently explored by botanists.

Brooklyn Botanic Garden

Viburnum Rafinesquianum Schultes

HOMER D. HOUSE

This common Viburnum of the eastern United States has had applied to it during the past few decades at least three different names. Long known as *Viburnum pubescens*[1] a name now applied to a more southern species described by Britton as *Viburnum venosum*,[2] it finally came to be known as *Viburnum affine* Bush, var. *hypomalacum* Blake.[3] Early writers were wont to refer *Viburnum villosum* Raf.,[4] not Swartz, 1788 (*Viburnum Rafinesquianum* Schultes[5]) to this species, although Blake (l.c. 13) seems to hold that the phrase "umbel 5-fidus" used by Rafinesque in his very brief and rather inadequate description disqualifies the name.

Long convinced that Rafinesque could have had under consideration no other eastern Viburnum the writer undertook an examination of the umbels of this species, with the result that out of 182 umbels examined, three were 8-rayed, thirty-nine were 7-rayed, thirty-four were 6-rayed, *sixteen were 5-rayed*, eight were 4-rayed and two were 3-rayed. Hence it seems probable and altogether likely that Rafinesque had before him a 5-rayed specimen which was described without consultation of additional material. The name as emended by Schultes should be adopted for this species as has been recently done by Small.[6] The western form of this species then is to be designated as:

Viburnum Rafinesquianum Schultes, var. **affine** (Bush) comb. nov. *Viburnum affine* Bush; Schneider, Ill. Handb. Laubh. 2: 649. f. 415, 1-m. 1911—Blake, Rhodora **20**: 14. 1918.

The range of this variety has recently been found to extend eastward to Harris Hill, Erie county, New York, where collections have been made by the late F. W. Johnson, and more recently by Mr. C. A. Zenkert.

NEW YORK STATE MUSEUM,
ALBANY, N.Y.

[1] Robinson & Fernald, Gray's Manual, ed. 7, 759. 1908—Britton & Brown, Illustrated Flora of the Northern States and Canada, ed. 2, **3**: 271. 1913.

[2] Britton, N. L. Manual of the Flora of the Northern States and Canada, ed. 1, 871. 1901.

[3] Rhodora **20**: 14. 1918.

[4] Med. Rep. II. **5**: 361. 1808.

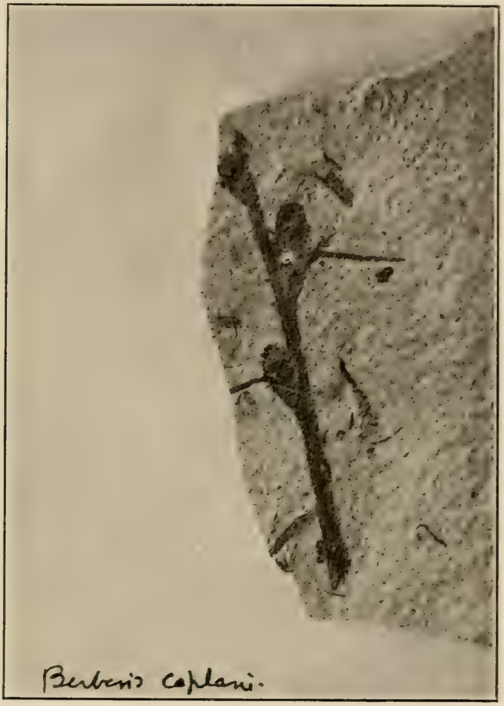
[5] Syst. **6**: 630. 1820.

[6] Manual of the Southern Flora, 1271, 1933.

A fossil Berberis

T. D. A. Cockerell

Among the fossil plants found by Mr. Allan Caplan in the Miocene shales at Creede, Colorado, is a small twig of typical barberry, as distinguished from *Mahonia* or *Odostemon*, to which American Miocene fossils of this family have been referred. The accompanying figure from a photograph by my



colleague Professor H. Rodeck, shows the characters well. The actual length of the piece is 38 mm., and the simple spines (as in various Asiatic species) are 8 mm. long. directed outward and somewhat downward. I can almost exactly match the specimen with a piece of Japanese barberry out of the garden. The species may be called **Berberis caplani,** n. sp.

Boulder, Colorado

BOOK REVIEW

A flora of the St. Lawrence basin

The new "Flore laurentienne" by Frère Marie-Victorin[1] (written in French) is a most valuable contribution to our knowledge of the vascular flora of northeastern North America. It is a complete reference work for the region to which it applies. It does not pretend to be a complete treatise on the flora of Quebec, but merely of the southern quarter of this province, comprising the St. Lawrence basin. The territory of Ungava, Gaspé, and Anticosti are not included. A bibliography of the principal botanical works and periodicals essential to all workers on the flora of Quebec is given, together with a history of botanical activity in that province and discussions of the geologic history, physiography, and climate of the region. The province of Quebec is divided into 3 phytogeographic regions—the Arctic, the Hudsonian, and the Laurentian—and the last of these is further subdivided into 3 subregions, the Bouclier Precambrian, the Appalachian, and the St. Lawrence alluvial plain. Good keys are supplied to the families, genera, and species. Several specialists were consulted in groups where they are recognized authorities—Prat in the *Gramineae*, Gates in *Oenothera*, Wiegand in *Amelanchier*, Mackenzie in *Carex*, Lloyd in *Utricularia*, Bailey in *Rubus*, and Erlanson in *Rosa*. In the opinion of the reviewer, a few other groups should have been handled by recognized specialists, notably the *Scrophulariaceae*, *Polemoniaceae*, *Vacciniaceae*, *Boraginaceae*, and *Crataegus*.

In general the nomenclature used is up-to-date and in accordance with the International Rules, although in some cases there is a pronounced tendency toward "lumping" in regard to families and genera. Family and generic limits, however, are largely matters of personal opinion, on which taxonomists will probably always differ. The line drawings illustrate every genus and almost every species and are well chosen to illustrate only the essential characters which the user of this work will need in identifying an unknown plant. The number of

[1] "Flore laurentienne," by Frère Marie-Victorin, D.Sc. 917 pp., 22 maps, 2800 line drawings by Frère Alexandre, L. Sc. Imprimerie de La Salle, 949 Rue Côté, Montreal. 1935. $5.

genera and species described and figured is as follows: pteridophytes—22 genera, 64 species; gymnosperms—8 genera, 13 species; dicotyledons—405 genera, 987 species; and monocotyledons—119 genera, 504 species. In addition 16 pteridophytes, 1 gymno-sperm, 264 dicotyledons, and 68 monocotyledons occurring in other parts of Quebec are mentioned. A 14-page glossary, an explanation of the abbreviations of authors' names, and a statistical table are included at the back of the book.

The reviewer is particularly pleased to note that Marie-Victorin has accepted the most recent discoveries regarding the identity of numerous eastern American plants formerly thought to be conspecific with European forms, but now found to be distinct. The common bracken is thus *Pteridium latiusculum* (not *aquilinum*), the lady-fern is *Athyrium angustum* (not *Filix-femina*), the rock polypody is *Polypodium virginianum* (not *vulgare*), the broad-leaved enchanters-nightshade is *Circaea latifolia* (not *lutetiana*) and the Canadian species is *C. canadensis* (not *intermedia*), the American liverleaf is *Hepatica americana* (not *triloba*), the red-berried elder is *Sambucus pubens* (not *racemosa*), the American cranberry-tree is *Viburnum americanum** (not *Opulus*), etc. The use of *Actaea pachypoda* for our common thick-pedicelled white baneberry (instead of *A. alba*) and of *Lycopodium flabelliforme* for our trailing Christmas-green (instead of *L. complanatum*) are also in accordance with most recent studies.

H. N. Moldenke

* Marie-Victorin is in error in his use of this binomial. *Viburnum americanum* Mill., as Dr. Blake has shown, is synonymous with *Hydrangea arborescens*. The correct name for the American cranberry-tree is *Viburnum trilobum* Marsh.

FIELD TRIPS OF THE CLUB

WEST VIRGINIA FIELD TRIP, MAY 29–JUNE 2

Five members of the Torrey Botanical Club enjoyed a foray in the mountains of the Monongahela National Forest of eastern West Virginia over the Memorial Day week-end. This trip should be an annual one of the club. Its success was due to the preliminary scouting and guidance of Rev. Fred W. Gray of Philippi, W.Va., a Methodist minister, who finds time among numerous parish duties to be one of the most extensive collectors of lichens and mosses in America and to correspond with German lichen specialists, one of whom, Dr. Heinrich Sandstede, has named a cupped lichen, *Cladonia Grayi*.

The party left Jersey City Wednesday evening, and reached Davis, West Va., at 2 P.M., on Thursday where Mr. Gray, and his daughter, Miss Henrietta, were waiting. He led us at once to Canaan Mountain, where he had spent the forenoon marking out species in which he thought we would be most interested.

He showed us *Cladonia brevis*, and *digitata*, the second interesting to find so far south, and commoner species. A little *Cetraria islandica* was found on the summit, at 4,000 feet. Then we drove to Canaan Swamp, where we found much *Cladonia gracilis*, f. *dilatata* in a spruce swamp at 3,500 feet, suggestive of the occurrences of this species in the Adirondacks and northern New England. A stately herb in this swamp, new to us, was *Euphorbia Darlingtoni*, three feet tall, with very large yellowish green bracts.

On Friday, Mr. Gray could not be with us, but he had arranged with Supervisor A. W. Wood of the Monongahela National Forest, for our guidance to Spruce Knob, 4,860 feet, from a Civilian Conservation Corps Camp on Laurel Branch. On the way in from Elkins, on a ridge east of Shaver's Branch of Cheat River, we saw *Clintonia umbellulata*, a beautiful plant, and plenty of *Trillium undulatum*. From the C.C.C. camp, one of Mr. Wood's rangers led us over narrow, rocky roads, up and down steep mountainsides, through the Sinks, a limestone region where the streams disappear and reappear, to the foot of Spruce Knob, to the summit of which we had to climb only about 800 feet in altitude.

Going up the path to the abandoned fire observatory, we soon began to see great numbers of *Dicentra eximia*, rare northward, but the prevailing bloom at the season on this mountain, very handsome and profuse in its purple flowers, resembling the Garden Bleeding Heart. Fossil Calamite impressions were frequent in the sandstone fragments along the path.

The summit of Spruce Knob is a long, rather level area, a mile wide, and eight miles long, mostly above 4,500 feet. The ascent from the high valley on the west is gentle, but there is a drop of almost 3,000 feet into the valley to the east and a magnificent view covering several parallel high ridges in that direction.

On the red spruces and on *Abies Fraseri*, near the highest point, we found our old friend of high spots, from Gaspé to the Great Smokies, *Parmelia Cladonia*. Walking northward, we found large and robust masses of *Cladonia rangiferina*, as tall as one finds it 700 miles north. But the prize discovery was *Cladonia alpestris*, rarely reported south of the latitude of New York, and not before found in West Virginia. It grew with *C. rangiferina*, in sheltered crevices fractured in the summit sandstone. *C. gracilis*, *f. dilatata* was common in the spruce woods on the west slope, which we descended back to our car.

We sought another way off Spruce Knob, and descended about 2,500 feet, along rather alarming roads, one way, no place for turn outs, with steep slopes dropping several hundred feet into gullies, on the outside. On the way, a furry growth on the bars of a gate at a mountain farm proved to be dense masses of *Alectoria jubata*, *Usnea barbata*, and *Ramalina calicaris*, mingled together like sheep's wool.

On Saturday, Mr. Gray and his daughter and two of his sons joined us and we went to Cheat Bridge, where we found ample, robust *C. gracilis*, f. *dilatata*, *Parmelia Cladonia* and other interesting things. Mr Gray remained with us until mid-afternoon, showing us more of his Cladonia locations, and we parted with him and his children in the hope that we may enjoy more such excursions with such an accomplished and kindly guide.

Raymond H. Torrey

TRIP TO SPARTA ON MAY 30, 1935

On May 30th a small party visited a few of the interesting spots in the vicinity of Sparta, N.J. In the morning a search was made for ferns in a swampy section along the railroad west of the town. *Dryopteris* hybrids were frequent and colonies of *Botrychium matricariaefolium* and *Ophioglossum vulgatum* were seen. In Sparta Glen the *Phegopteris Dryopteris* and *Phegopteris polypodioides* colonies were visted and *Streptopus roseus* was seen in flower. In the afternoon the party visited the Pine Swamp near the top of the hills east of Sparta. Only one noteworthy fern was found here, a few plants of *Botrychium angustisegmentum* at the edge of the swamp, but other interesting plants were noted. *Calla palustris*, *Clintonia borealis* and *Nemopanthus mucronata* were in flower. The possibility of *Arceuthobium pusillum* occurring on the Black Spruce was suggested and everybody searched for it on the small trees near the trail. Mr. V. L. Frazee soon found a tree which had a number of the little plants growing on the twigs. This is the second New Jersey station to be discovered for the dwarf mistletoe, the other being at the bog west of Lake Mashipacong near the top of the Kittatinny ridge in Sussex Co. This bog is also called a "Pine Swamp." The Sparta Pine Swamp is located at the extreme eastern edge of Sussex Co. about 35 miles from New York City. The elevation is 1,250 feet above sea level which is about 50 feet higher than the Mashipacong Pine Swamp.

JAMES L. EDWARDS

TRIP OF JUNE 29–30

Twelve members and guests assembled at Turnwood for the trip along the Beaverkill for native stands of *Aconitum noveboracense*. Saturday afternoon was spent along the stream and a few aconites were in full bloom. Weather was ideal and the two small showers did not spoil the party. Showers are frequent at 2,400 feet.

Saturday was spent at the Rice House in Livingston Manor some twenty miles away. An excellent place to visit since the owners know every part of the region. Another short trip was under way after dinner.

Sunday morning we visited Shin Creek and followed the gorge and falls for some distance. Shin Creek empties into the

Beaverkill at Lewbeach. The falls are well worth seeing. Returning to the road along the Beaverkill we passed another falls and continued up to the entrance to the Balsam Lake Club. Parked the cars and followed the Beaverkill up to the 2,800 foot level. Then we followed a small stream and visited Tunis Lake. Some fine stands of aconites were found along the Beaverkill but none were found on Shin Creek or Tunis Lake. This extends the range of aconites along the Beaverkill from Roscoe to the 2,800 foot level. We did not try to reach the top of Double Top Mountain but will do so the next trip. Members of the club found many other plants of interest. The region covered is private property and permission must be secured before one can enter but this has done much to keep the region in its natural condition.

WM. J. BONISTEEL

TRIP OF AUGUST 24

Mr. W. Herbert Dale, who entertained members and guests of the club in his fern garden, at 23 Overlook Avenue, West Orange, N. J., sends a list of the species, which, from its variety, appears to represent one of the largest private collections in this vicinity. The list speaks for itself:

Adiantum pedatum (Maiden hair)
Athyrium angustum (Lady fern)
Athyrium acrostichoides (Silvery fern)
Athyrium angustifolium (Narrow leaf)
Asplenium platyneuron (Ebony spleenwort)
Asplenium Trichomanes (Maidenhair spleenwort)
Asplenium cleptolepis (Rue spleenwort)
Botrychium obliquum (Grape fern)
Botrychium dissectum
Botrychium virginianum (Rattlesnake fern)
Camptosorus rhizophyllus (Walking fern)
Cheilanthes lanosa (Lip fern)
Cryptogramma Stelleri (Slender cliff brake)
Cryptogramma acrostichoides (Persley fern)
Cyrtomia falcatum (hardy exotic)
Dryopteris filix-mas (Male fern)
Dryopteris marginalis (Marginal shield)
Dryopteris noveboracense (New York fern)
Dryopteris simulata (Massachusetts fern)
Dryopteris Thelypteris (Marsh fern)
Dryopteris spinulosa (Spinulose fern)
Dryopteris dilatata
Dryopteris cristata (Crested shield fern)

Dryopteris Clintoniana
Denstaedtia punctilobula (Hay scented)
Cystopteris fragilis (Fragile fern)
Cystopteris bulbifera (Bulbous fern)
Lygodium palmatum (Climbing fern)
Osmunda regalis (Royal fern)
Osmunda cinnamomea (Cinnamon fern)
Osmúnda Claytoniana (Interrupted fern)
Onoclea sensibilis (Sensitive fern)
Onoclea struthiopteris (Ostrich fern)
Polypodium virginianum (Polypody)
Polystichum acrostichoides (Christmas fern)
Polystichum acrostichoides (crested form)
Polystichum acrostichoides (crisped form)
Pellaea atropurpurea (Purple cliff brake)
Phegopteris hexagonoptera (Broad beech)
Phegopteris polypodioides (Lond beech)
Phegopteris Dryopteris (Oak fern)
Pteris aquilina (Bracken)
Scolopendrium vulgare (Hearts tongue)
Woodsia obtusa (Blunt lobed woodsia)
Woodsia ilvensis (Rusty woodsia)
Woodwardia areolata (Net-veined chain fern)
Woodwardia radicans (western)
Ophioglossum vulgatum (Adders tongue)
Dryopteris Goldiana
Dryopteris Tsussemense (hardy Japanese)
Dryopteris Bootii.

All but three of these are native and eastern. The only species that might readily be added from this region are *Woodwardia virginica*, *Asplenium montanum* and *Schizaea pusilla*.

PROCEEDINGS OF THE CLUB

Meeting of May 29, 1935

The meeting was called to order by President Hazen at 3:30 P.M. at the New York Botanical Garden.

The minutes of the meetings of April 17 and May 7 were read and approved. Twenty-six members were present.

The following persons were elected to membership in the Club: Mr. E. B. Mains, University Herbarium, Museum Building, Ann Arbor, Mich.; Miss Antoinette Wilson, 89 North Main Street, Spring Valley, N. Y.; Miss Rose Jacobsen, Julia Richman High School, 319 East 67th Street, New York City; Miss Dorothy Pease, 12 Cedar Avenue, Montclair, N. J.; Mr. W. Herbert Dole, 23 Overlook Avenue, West Orange, N.J.; Mr. W. M. Banfield, 25 Morris Avenue, Morristown, N. J.

Dr. H. A. Gleason, who was appointed as one of the two delegates from the Torrey Botanical Club to the International Botanical Congress, stated that he could not attend. Accordingly the Council recommended Dr. Tracy Hazen to take the place of Dr. Gleason as representative in the Congress and also to represent the Club in the nomenclature discussion at Amsterdam. As he could not be present he was authorized to appoint a substitute to represent the club.

It was moved by Dr. Hazen that the Budget for 1935 be the same as that of 1934, as recommended by the Council. This motion was unanimously passed.

Dr. A. B. Stout, Director of the Laboratories of The New York Botanical Garden gave an illustrated talk on the "Studies of Seedless Grapes."

Mrs. Wanda K. Farr of the Boyce Thompson Institute also gave an interesting talk on the "Formation and microscopic structure of cellulose membranes." This talk was also illustrated.

FORMAN T. MCLEAN
Secretary

MISS HELENE LUNT

Miss Helene Lunt, an active and valuable member of the field committee of the Torrey Botanical Club, died on Aug. 3, after a long illness. Miss Lunt will be remembered by those who enjoyed her keen observations and wide knowledge of plants and birds, on field trips of this club and of the Linnaean Society. She was very helpful to the Chairman of the Field Committee in volunteering to lead at least two trips every season. She was thorough and painstaking on these trips, scouting the regions beforehand to make sure of interesting objectives for the members to enjoy on the scheduled date. This carefulness and accuracy made her an ideal leader for such trips, and she will be missed in this phase of the club's activities. She continued her interest in the outdoors, though in declining health, up to within a few weeks of her death. My last communication from her was from Caldwell, N. J., where she was seeking recuperation, when she sent me a flowering branch of the rare shrub, *Dirca palustris*, which she had found along a stream near that town. Her death is a loss to those who appreciated her active mind, alert to all outdoor things, and her extensive acquaintance with the plants of the club's range.

RAYMOND H. TORREY

NEWS NOTES

New York State's biggest tree-planting season, conducted by the Civilian Conservation Corps is under way. The State Conservation Department estimated that 40,000,000 trees will be planted on 50,000 acres of land before the season ends. Planting operations are being conducted in the counties of Allegany, Chautauqua, Chenango, Cortland, Franklin, Jefferson, Lewis, Madison, Oswego, Otsego, St. Lawrence, Schoharie, Schuyler, Steuben, Tioga, Tompkins and Suffolk.

The Philadelphia Academy of Sciences has sponsored twenty-four expeditions for collecting this year. Among these Brooke Dolan is heading an expedition to collect birds, animals and plants in eastern Tibet. Dr. Frances W. Pennell has been collecting plants in the high plateau of central Mexico. Mrs. J. Norman Henry and Miss Josephine Henry collected plants in British Columbia. Dr. Walter M. Benner collected in the northwestern part of the United States. Dr. Witmer Stae and Dr. Bayard Long have also made collecting trips.

Dr. Harold N. Moldenke, who reviews the Flora Laurentienne in this issue is now at Kew, England, continuing monographic work on the Verbenaceae and Avicenniaceae while his wife is continuing work on the taxonomy of the ascomysetous family Patellariaceae. In the spring they plan a long continental tour, visiting the chief herbaria of the various countries.

Under a fellowship of the John Simon Guggenheim Foundation of New York, Dr. T. H. Goodspeed, professor of botany and director of the Botanical Garden of the University of California, will spend the months October to February collecting species of *Nicotiana* and related genera in Peru, Chile, Bolivia and Argentina. Accompanying Dr. Goodspeed as collector will be James West, of San Rafael, and Mrs. Ynes Mexia, collector in Central and South America, will join the expedition at Lima. Most of the collecting will be done in higher altitudes of the Andes, but it is anticipated that certain members of the expedition will collect south of Santiago, crossing the Andes in the Chilean lake region and continuing through the Patagonian pampas to Buenos Aires. (*Science*)

THE TORREY BOTANICAL CLUB

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GEORGE T. HASTINGS

John Torrey, 1796-1873

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2587 Sedgwick Ave.,
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TORREYA

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Plant invasion following fires

Paul W. Graff

The relationship of plants to burned-over areas has received comparatively little attention by American botanists. As an ecological problem it seems to me that this offers a number of interesting possibilities. It is for this reason, and because of the apparently unusual attendant circumstances, that two recent papers by Torrey[1] appearing in this journal are of particular interest. These had to do with wide spread invasions by *Marchantia* following forest fires. We are comparatively well acquainted with *Chamaenirion*, a pyrophilous plant found commonly about the entire north temperate region, and the lodgepole pine of our western states, but information regarding the plant invasion and sequence of development upon eastern burns is fragmentary.

It would seem—and this is offered as a suggestion and with the hope that someone will follow it up with their notes and observations—that burns resulting from the firing of piled slash or piles of railroad ties offer an excellent opportunity for gathering interesting ecological data. This would be particularly true if carried out through a sufficient length of time. A comparison of several such localities with differing soil, moisture and floristic conditions should prove an attractive problem. One does not always need a large area to develop data of a worth while nature.

It may be said that in general the soil of such localities re-

[1] Torrey, R. H. *Marchantia polymorpha* after forest fires. Torreya **32**: 9–10, 1932.

Torrey, R. H. Another report of *Marchantia polymorpha* after forest fires. Torreya **32**: 128–129. 1932.

mains bare of vegetation through the first season following the intense heat of a high brush pile. During the next season one is likely to find certain members of the moss group starting their invasion near the periphery, and possibly small scattered colonies starting in other portions. Frequently a few discomycetous fungi are also found. These are usually scattered about the interior of the circle. A close inspection may even disclose members of other divisions of the fungous group.

Among the early invaders one will usually find such moss genera represented as *Bryum*, *Ceratodon* and *Funaria*, with possibly *Polytrichum* as a later arrival in dry localities. Among the fungi one would naturally expect to find *Pyronema confluens* appearing as the most common example. Such others as *Ascobolus carbonarius*, *Geopyxis cupularis*, *Peziza pustulata*, *Peziza violacea* and *Rhizinia inflata* may be encountered, and there is always the chance of making new acquaintances.

The following season the mosses usually become more generally dispersed over the plot, and flowering plants may begin their invasion. This latter naturally begins near the margin of the area, where the effect of the fire has possibly not been so great. A few casuals may be seen among the earlier moss patches in the inner portion. It must be recognized, however, that any sequence of events is easily altered by varying conditions of locality.

With different soil, moisture, acidity and temperature factors retardation or hastening of plant development may be expected. These factors also regulate the sequence in the series of plants to develop prior to reëstablishment of the pre-fire state. An open sand or compact clay soil, a naturally dry or damp situation, a hollow, a knoll or a sloping hillside will each tend to induce variation. Sufficient moisture and adequate drainage are important aids in hastening revegetation, provided they operate in proper conjunction with one another.

Seaver and Clark[2] and Seaver[3] have shown that intense heat may materially increase the soluble matter in the soil, and that flowering plants may be retarded in their growth by this con-

[2] Seaver, F. J. and Clark, E. D. Biochemical studies of soils subjected to dry heat. Bioch. Bull. **1**: 413–427, *pl. 7*. 1912.

[3] Seaver, F. J. North American Cup-fungi. 1–284, *pls. 1–45+figs. 1–15*. 1928.

centrate. On the other hand, it is comparatively well known that many cryptogamous plants are able to adapt themselves to the presence of such concentrates, and sometimes are even favored by their presence. This is particularly true among the fungi, and to a lesser extent among the bryophytes. When we consider the flowering plants one finds the number tolerant to a pyrophilous condition greatly reduced.

The importance of good drainage as an aid to rapid revegetation is quite evident from the preceding suggestion. If the soluble concentrates produced by the fire are rapidly leached away reversion, with a steady and progressive plant invasion, will take place. But if, on the other hand, these concentrates are held in the soil a retardation of plant development is to be expected.

I have personally observed several instances of mass invasion by *Marchantia polymorpha* following forest fires in the Rocky Mountain region of western Montana. These invasions occurred in closely protected mountain meadows that were surrounded by steep slopes, and at elevations of from 3,500 to 6,500 feet. In each case they followed severe fires that completely denuded the meadow areas and scattered desolation over hundreds of acres through the hills.

In order to effect such a wholesale invasion as occurred in these instances, where an acre or more was covered with a practically pure stand of *Marchantia*, two important factors seemed very essential. These necessary factors are the presence of a considerable amount of humus and a soil having a high moisture content during the period of growth and reproduction. The mountain meadows to which I have referred had a deep gravelly soil that contained a large quantity of humus. Deep snow fields and the early rains of spring convert these into marsh-meadows during the early growing season. Fall rains supply sufficient moisture to insure fall growth and the development of spore producing organs. The excessively dry summers of this region, though causing a temporary dormancy, are apparently no deterrent to the ultimate growth of this plant. *Marchantia* is peculiarly adapted to withstand excessive dryness in its vegetative state, and recovers a normal condition quickly with a renewal of humid conditions. It should be noted here that *Marchantia* was not found on the adjacent, steep, gravelly slopes.

Another paper[4] is to appear shortly in which the invasion of these marsh-meadows is discussed in more detail.

There appeared a very sharp distinction between revegetation as it was taking place in the marsh-meadows and the slopes of the surrounding hills. In the former grasses were beginning to make their appearance during the second season after the fire, and the trend appeared to be very definitely toward a natural resumption of the pre-fire condition. Upon the adjacent slopes *Chamaenirion* was a dominant feature among the few invading species tolerant of the situation. Among these plants, and protected by their shade, young seedlings of the lodgepole pine were present in great numbers. Previous to the time of the fire these forested hillsides were dominated by the characteristic Douglas fir and larch association that had been typical of the several localities. This change is illustrative of the natural forest replacement in this portion of our Rocky Mountains. Return of both Douglas fir and larch is slow, and the lodgepole pine persists for a considerable period before being finally replaced.

The lodgepole pine proves to be the natural intermediary in the west between the devastation of a forest fire and the return to the normal conditions characteristic for the region. It is a tall, straight, slender tree and generally grows in very dense stands that are difficult to penetrate.

Those of us who have been so fortunate as to spend some time in any of our western national parks are aware that the western guide has a ready answer for most questions of the uninitiated. In a "flora" of one of the northern Rocky Mountain districts published not so very long ago it was explained that the common name of this tree was given it because of the fact that the tree is easily blown over and being in such dense stands they naturally lodge against one another. While this statement may be ecologically true as to the tree it is an historical error with respect to the name. The straight, slender, light weight poles were formerly held in high esteem by the aborigines of the region who made use of them as travois poles and poles for their tepees or lodges. The name seems to have been first used among the early trappers and before the actual opening up of

[4] Graff, P. W. Invasion by *Marchantia polymorpha* following forest fires. Bull. Torr. Bot. Club.

the country. It was first applied to the cut poles and later to the trees that produced them.

The lodgepole pine is well adapted to initiate natural reforestation upon these mountain slopes. It is capable of making its start beneath the shade of a few well chosen herbaceous plants which it soon overshadows and supplants as the dominating feature of the landscape. It, in turn, produces a dense shade beneath which the earlier natural stand may return slowly but ultimately to the region. Beneath the lodgepole it is possible for seedlings of the larch and Douglas fir to make their start, but only after the lodgepole has reached the size of early maturity and natural thinnings have appeared.

Small burns and large areas each have their special interest in relation to vegetation. While the larger areas may appear more attractive, the smaller are in reality no less so if studied intensively. The results attained from a study of either may be of equal botanical importance.

Mount Vernon, N. Y.

An overlooked early collection from the Rocky Mountains

WILLARD T. MCLAUGHLIN

A chronological list[1] of plant collections made within the area now included in the state of Montana fails to take cognizance of a small but interesting series of specimens brought back to Northwestern University and eventually deposited in what is now known as the Babcock Herbarium of that institution. The collector was Mr. Oliver Marcy, for many years Deering Professor of Natural History and curator of the institution's natural history museum.

In April, 1866 Mr. Marcy left Old Mission, California, as a member of a government survey party sent to survey the Lolo, Lou Lou, or Northern Nez Perces Trail through the Bitter Root Mountains of Idaho and Montana. The plants collected on this expedition, numbering about 150 specimens, were identified by Asa Gray and George Vasey. They have been gone over and the nomenclature rechecked by the writer.

The following account is taken from a narrative of the trip written by Mr. Marcy and published in the Annual Report of the Department of Natural History, Northwestern University, for the year 1887.

"In 1863 gold was discovered at Alder Gulch, now Virginia City, Montana. Then the merchants of the west coast petitioned Congress to build a wagon road from Lewiston, Idaho, to Virginia City, Montana. An appropriation was voted for that purpose. In 1866 a party was sent to Lewiston with instructions to make a rapid reconnoisance, select a route, and proceed to construct a road. The Lou Lou trail was the shortest and the most feasible trail across the mountains, but the sum appropriated was not large enough to construct a road on this or any other route between the points. The money was expended on this trail.

"The latitude of the Lou Lou trail is about 46° 30′. It crosses the Bitter Root Mountains from the great plain of the Columbia on the west to the Bitter Root Valley, in Montana, on the east.

"Eastward from Craig's Mountain the plateau is a grassy plain, much cut up with cañons. At the crossing of the Clear-

[1] Blankinship, J. W. A Century of Botanical Exploration in Montana. Montana Agric. Coll. Sci. Studies **1**: 1–31. 1904.

water (at Schultz's Ferry) the cañon is 2,000 feet deep and the sides are very steep. From the Ferry to Mussel Creek, at the west base of the mountains, there is a broken country, at first sparsely covered with 'yellow pines' [*Pinus ponderosa* Dougl.],[2] then more densely with firs; and at the creek and all over the west side of the mountains there is a very dense forest of magnificent firs [*Abies grandis* Lindl.], arbor vitae [*Thuja plicata* Don.] and white pines [*Pinus monticola* Dougl.].

"The party of 1866 camped at the west base of these mountains on Mussel Creek, from the 5th to the 26th of June, and it rained 17 out of the 21 days. In passing the mountains the party found the snows seven feet deep in the woods where it had not drifted; so did Lewis and Clarke, who crossed the mountains just 60 years before at the same time of the year. The snows had been much deeper during the winter. Now they were coarsely granulated and so compacted that they bore the horses very well except at the sides of the underlying logs. The heat reflected from the trees had thawed basins around their trunks and sometimes completely to the ground. No frozen ground was seen. Flowers seemed in haste to spring up. A trillium [*Trillium ovatum* Pursh.] was gathered in blossom, the stem of which had forced itself up through three and a half inches of granulated snow.

"The fir trees began to grow, forming new wood and leaves at the ends of the branches while the snow was seven feet deep between the trees. It is probable that the snow, beginning to fall in September or the first of October, protects the ground so completely that it never freezes.

"The University Herbarium contains one hundred and fifty species of plants collected on this expedition, and most of them were collected in the mountain region. These plants have been studied by Dr. Vasey, botanist to the U. S. Department of Agriculture, and also by Dr. Gray. Perhaps the most rare plant in the collection is the *Wulfenia reniformis* Hook. It was found at an altitude of six thousand feet, June 28, in bloom, near the snow.

"The *Caltha leptosepala* was found in circumstances very interesting to the botanist. Coming down from a peak to a sag

[2] Data within the brackets has been added by the writer.

in the ridge, a circular area was seen two rods in diameter, from which the snow was melted, apparently by spring water. The whole circle was thickly covered by the white blossoms which crowded closely to the snow wall, seven feet high, which inclosed the area.

"We have before mentioned the finding of a specimen of *Trillium ovatum*, forcing its blossom and leaves through three inches of granulated snow. The plant was abundant on the west side of the mountain.

"Some plants familiar in the East were found remarkably dwarfed by the cold. The *Claytonia caroliniana* [apparently *C. lanceolata* Pursh.; represented by a single fragmentary specimen] was found at an altitude of six thousand feet, not more than an inch high, yet in full bloom. It covered the ground thickly under a tree. A *Ranunculus* [immature] was found in the margin of Lake Templin, altitude five thousand feet. Dr. Gray expressed the opinion that it was *R. rhomboideus* dwarfed by the cold. The length of the specimen is about an inch. The yellow blossoms covered the water thickly. Dr. Vasey dissented from the opinion that it was *R. rhomboideus.*

"Only one plant of the *Xerophyllum tenax* was found in blossom. This was at an altitude of four thousand feet, on the west side of the mountain, June 26. The plants were common at the highest altitudes.[3]

"The *Lewisia rediviva*, the 'Bitter Root,' which gives name to the mountains, and also to the river and valley which the missionaries named St. Mary's, was found at the Hot Springs, July 6. This plant became known through the collection of Lewis and Clarke, who passed this locality at the time of its blossoming in 1806.

"In riding over the snow at midday, July 3, at an altitude of six thousand feet, the horses' feet sank into the melting snow to the fetlock. Suddenly it was noticed that all of the tracks of the horses, over quite a large area, appeared red as if stained with blood. Collecting some of the snow and applying the lens, the little grains of the *Protococcus nivalis* were clearly seen float-

[3] Apparently 1866 was not a beargrass year. This very showy member of the Lily family with its dense, club-shaped raceme of white flowers seems to bloom profusely only at intervals, variously estimated at from three to seven years.—W.T.M.

ing in the current of water in the melting snow. This little unicellular plant had previously multiplied over the surface of the snow, but in the melting of the snow the grains had been carried below the surface to a depth at which the snow was still permanently hard. The surface did not show the plant at all. The specimens of this plant which were collected failed to reach our herbarium. The botany of this trail is far from being completely known. It is a region in which the botanist of the near future will find great pleasure."

The following chronological list of plants is incomplete due to lack of data or to the fragmentary nature of some of the collections, rendering their identification impossible.

May 15, 1866. Lewiston, Idaho.
Phacelia linearis (Pursh) Halz.
Erysimum asperum DC.
Troximon cuspidatum Pursh.
Sisymbrium Sophia L.
Cogswellia Canbyi (Coult. & Rose) M. E. Jones.
Collomia linearis Nutt.
Achillea lanulosa Nutt.
May 17, 1866. Near Lewiston, Idaho.
Fritillaria pudica (Pursh) Spreng.
May 21, 1866. Near Lapwai, Idaho.
Geranium viscosissimum Fisch. & Mey.
Phlox speciosa Pursh.
May 23, 1866. Lapwai, Idaho.
Claytonia perfoliata Donn.
Collinsia parviflora Dougl.
May 24, 1866. Near Lapwai, Idaho.
Ptilonella scabra (Hook.) Nutt.
Mimulus microphyllus Benth.
Camassia quamash Greene.
Orobanche Sedi (Suksd.) Fernald.
May 25, 1866. Near Lapwai, Idaho.
Viola linguaefolia Nutt.
May 26, 1866. Bitter Root Mountains, Idaho; lat. 46°30′.
Mitella trifida Graham.
May 27, 1866. High prairie, 40 miles east of Lewiston.
Mertensia oblongifolia (Nutt.) Don.
Viorna hirsutissima (Pursh) Heller.
Calochortus elegans Lindl.
May 28, 1866. West of Bitter Root Mountains, Idaho.
Lonicera ciliatum (Muhl.) Pursh.
June 1, 1866. Schultz Ferry on the Clearwater, Bitter Root Mountains, Idaho.

Rubus parviflorus Nutt.
Sisyrinchium grandiflorum Dougl.
Calypso bulbosa (L). Oakes.
Pachystima myrsinites (Pursh) Raf.
Coptis occidentalis (Nutt.) T. &. G.

June 5, 1866. "Camp 9," Bitter Root Mountains, Idaho.
Phleum alpinum L.
Lathyrus venosus Muhl.
Erythronium grandiflorum Pursh.
Mertensia paniculata (Ait.) Don.
Ribes lentum (Jones) Coville & Rose.

June 8, 1866. "Camp 9."
Ranunculus rhomboideus Goldie.?

June 15, 1866. "Camp 9."
Trillium ovatum Pursh.
Valeriana Scouleri Rydb.
Polygonum bistortoides Pursh.
Taxus brevifolia Nutt.
Arctostaphylos Uva-ursi (L.) Spreng.
Dentaria macrocarpa Nutt.

June 17, 1866. "Camp 9."
Asarum caudatum Lindl.
Linnaea borealis L. var. *americana* (Forbes) Rehder.

June 20, 1866. West base of the Bitter Root Mountains.
Erythronium montanum S. Wats.
Geranium Richardsonii Fisch & Trautv.
Trifolium Douglasii House.

June 26, 1866. "The day we started from camp 9 where we had been for 20 days waiting for the snow to go off. Bitter Root Mountains, alt. 4000–4500 feet, near snow."
Xerophyllum tenax (Pursh) Nutt.
Viola sempervirens Greene.
Trillium ovatum Pursh. (growing through 3½ inches of snow).
Acer glabrum Torr. var. *Douglasii* (Hook.) Dippel.
Clematis columbiana (Nutt.) T. & G.
Calochortus elegans Lindl.

June 28, 1866. Porphyry Peak, Bitter Root Mountains.
Syntheris major (Hook.) Heller.
Ribes viscosissimum Pursh.
Menziesia ferruginea Smith.
Mertensia oblongifolia (Nutt.) Don.
Gilia pungens (Torr.) Nutt.

July 4, 1866. "Camp 15." 6000 feet, alt.
Senecio lugens Richards.
Viola glabella Nutt.
Antennaria racemosa Hook.
Ptilocalais nutans (Geyer) Greene.

July 6, 1866. Lou Lou Fork near Hot Springs, Montana.
Trollius laxus Salisb. var. *albiflorus* A. Gray.
Pedicularis racemosa Dougl.
Penstemon confertus Dougl.
Sedum Douglasii Hook.
Pedicularis groenlandica Retz.
Pedicularis contorta Benth.
July 7, 1866. Lou Lou Fork.
Ceanothus velutinus Dougl.
Ledum glandulosum Nutt.
July 8, 1866. Lou Lou Fork.
Trifolium longipes Nutt.
Lewisia rediviva Pursh.
Tofieldia intermedia Rydb.
July 10, 1866. Gold Creek, Montana.
Campanula rotundifolia L.
Linum Lewisii Pursh.
July 11, 1866. Deer Lodge Valley, Montana.
Machaeranthera canescens (Pursh) A. Gray.
Gaura coccinea Nutt.
Antennaria dioica (D. C. Eaton) Greene.
Malvastrum coccineum (Pursh) Gray
August 1, 1866. Fort Benton, Montana.
Hedeoma ovata A. Nels.
Mentzelia nuda T. & G.

Rocky Mountain Alpine Nurseries
Bigfork, Mont.

Two important studies in plant ecology published in unexpected places

Roland M. Harper

Important botanical contributions occasionally turn up in non-botanical literature. Two such items, of considerable interest to ecologists, have been unearthed recently, several years after their publication, in the chemical and geological libraries at the University of Alabama. The first was brought to my attention by the professor of chemistry, and the second I came across in looking up literature for a geological bibliography.[1]

The first is by W. G. Bateman and Lansing S. Wells, chemists at the University of Montana, on Copper in the flora of a copper-tailing region, in the Journal of the American Chemical Society, **39**: 811–819. April, 1917. It deals with a copper smelter near Anaconda, Montana, and contains partial analyses of the ash of several plants growing in tailings and mine waters, with special reference to copper, which is well known to be very toxic to some of the lower plants. Considerable arsenic, antimony, zinc and other metals were found in the soils, and sulphuric acid in the water, which made a very unfavorable habitat for most plants, large areas being entirely bare of vegetation. But the willows (*Salix fluviatilis*) were not completely killed, and *Dasiphora fruticosa*,[2] *Rosa Woodsii*, *Agropyron lanceolatum*, and *Equisetum variegatum* stood the abnormal conditions remarkably well.

In the trees and shrubs the copper was found to be chiefly concentrated in the bark, as if that was the plant's best way of getting rid of it. All the plants that tolerated copper and the other metals named also grew in natural soils in the same neighborhood that contained no appreciable amounts of them.[3]

[1] Bibliography of Alabama geology. Geol. Surv. Ala., Bull. 42, pp. 59–116. January, 1935. This contains references to 15 papers on fossil plants, among other things.

[2] As most readers of Torreya doubtless know, *Dasiphora fruticosa* (formerly included in *Potentilla*) is a Rosaceous shrub, common in some of the limestone regions of northwestern Connecticut and adjacent New York, if it is all the same species.

[3] Another way in which copper smelting is injurious to vegetation, mentioned only incidentally by Bateman and Wells, is by producing sulphurous fumes. Around the smelters of Ducktown and Copper Hill, Tennessee, vegeta-

The authors acknowledged the assistance of Dr. J. E. Kirkwood (1872–1928), who was professor of botany at the University of Montana at the time, and referred to some previous studies, including one on *Polycarpaea spirostylis*, the so-called copper plant of Queensland.[4] There is a bibliography of 24 titles, about half of them foreign, and all lacking authors' initials and complete page numbers. The average year of publication of the papers whose dates are given is 1900.

The second paper of ecological interest is by Robert H. Cuyler, of the department of geology of the University of Texas, on Vegetation as an indicator of geological conditions, in the Bulletin of the American Association of Petroleum Geologists, **15**: 67–68, figs. 1–12. January, 1931. The work was done in the vicinity of Austin, where there are several different Cretaceous formations, all calcareous. A fault running approximately north and south near the city separates the Edwards Plateau on the west from the black prairie (a part of the coastal plain) on the east.[5]

The author recognizes eight different formations, mostly fairly hard limestones, in the plateau region, and four, mostly marls and clays, in the coastal plain. There is one half-tone illustration of typical vegetation of each formation, and lists of a few trees and shrubs characteristic of each, prepared with the assistance of B. C. Tharp, professor of botany in the same institution. The different formations in each group are so much alike that any one not a geologist would hardly notice the differences, but Dr. Cuyler has made some surprisingly definite

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tion close by has been almost completely destroyed, and the effects on trees and crops have been noticed some distance into Georgia, which a generation or so ago caused some acrimonious discussions, and threats of litigation by Georgia against Tennessee. There seems to be little or no reference to this in botanical literature, and only a little in geological literature. See L. C. Glenn, Science II. **23**: 288. Feb. 23, 1906; also page 11 of my Natural Resources of Georgia (Bull. Univ. Ga., Vol. **30**, no. 3. Feb. 1930).

[4] They seem to have had only a second-hand reference to this, but the original study, together with an earlier work of similar nature not listed by Bateman and Wells, was cited by me in a paper on Vegetation and mineral deposits, in the Engineering and Mining Journal (New York), **112**: 693–694 Oct. 29, 1921. (Abstracted in the Literary Digest, Nov. 19, 1921.)

[5] For some earlier notes on the same neighborhood, by the present writer, with references to previous literature, see Bull. Torrey Bot. Club **47**: 295–297. 1920.

qualitative correlations between geology and flora, pointing out several cases of species present on one formation and not on neighboring ones. And if his studies had been quantitative and had included herbs, doubtless still other differences could have been found, for two areas might conceivably have the same species of plants on them, but in such different proportions as to give quite a different aspect to the vegetation.[6]

It happens that I made brief visits to Austin in the summers of 1918 and 1934, and took what notes I could on the vegetation near by, without suspecting any such definite correlations as Cuyler has made, but I have no reason to question the accuracy of his statements. However, it seems quite likely that if the same formations were traced to greater distances, and the vegetation on them studied in the same way, some exceptions to his correlations might be found. This is a promising field for future ecological work; and a revised geological map of the state, published since Cuyler's paper, should facilitate such a study.

University, Ala.

[6] See Ann. Rep. Fla. Geol. Surv. **6**: 175–180. Dec. 1914. Also Torreya **17**: 1 (footnote). Jan. 1917.

BOOK REVIEW

Lichen Flora of the United States[1]

The long anticipated posthumous publication of Professor Bruce M. Fink's "The Lichen Flora of the United States," completed by Mrs. Joyce Hedrick Jones, research assistant at the University of Michigan Herbarium, provides a valuable guide for the increasing number of students of this hitherto neglected department of botany. It is the only American work to cover the entire United States since Professor Edward Tuckerman's "North American Lichens," published in 1882.

This new Lichen Flora must be a part of the library of every serious student of these fascinating plants. Nevertheless, it does not seem to be the final and authoritative guide to American lichens which we had hoped it might be. It seems to us that it does not take sufficient account of the publications of other American workers, especially on the Cladoniae, to which we have given most attention, and which are most interesting to beginners in this field of botany. It is understood that the compiler of Prof. Fink's material, left at his death in 1927, was under some restraint on the part of the Department of Botany at the University of Michigan, as to admission of new species, and that only such material of these species as passed through her hands was admitted to the new book. This was a handicap to a complete presentation of the Cladoniae, for much of the recent extensive field work, and discovery of forms reported for the first time in North America, and based on determinations by Vainio, Sandstede and other eminent European lichenists, and published in American botanical journals, occurred after Professor Fink's death.

The treatment of the Cladoniae is a great improvement over that in the "Lichens of Minnesota," and covers the country much more fully. But it rarely goes beyond the species, and takes little account of varieties, forms and modifications, fixed by Vainio and Sandstede, adopted by the recent American workers. Take some examples: *Cladonia papillaria* is given without any forms, the differences in structure being given in the description

[1] *The Lichen Flora of the United States.* Bruce Fink, late Professor of Botany, Miami University, completed for publication by Joyce Hedrick, University of Michigan. X plus 426 pages, 46 plates. University of Michigan. 1935. $4.00.

of the species. But the clearly differing forms, *papillosa*, *stipata* and *molariformis*, named by European authors, and adopted by Robbins and Blake and Evans, found wherever the species occurs, are so useful in separating them, that such differentiations seem a necessity. Or, another example, *Cladonia cristatella*. This work gives the species, and only two varieties, *paludicola*, which was long ago separated from *C. cristatella*, by European authors, and is now reduced to synonymy, for *C. incrassata;* and *densissima*, which is based apparently on one specimen found on a fence post near Oxford, Ohio, which seems near Robbins f. *squamosissima*. Yet Evans, in his Cladoniae of Connecticut (1930) found ten *forms* of *C. cristatella*, named by Tuckerman, Vainio, Robbins, and Merrill, some of them sixty years ago, which seem valid and essential in any complete treatment of the genus in America.

Incomplete study seems to have been given to the KOH reactions on species of Cladoniae. In the key, several species are mentioned as "KOH plus," but the color reaction is not stated. In *C. subcariosa*, no mention is made of any reaction, although the prompt yellow, then red reaction on this species is its most helpful determinant, among other species somewhat resembling it. KOH reactions are not mentioned for *C. rangiferina*, *tenuis*, *alpestris*, *floridana*, *santensis* and *cariosa*, though all have been recorded, for some years, by other American and European students. Such lack of completeness lessens the value of this book and makes it necessary for us to continue to use other works; Evans, Robbins and Blake, Annie Lorain Smith and Lindau, for such chemical reactions.

The treatment of foliose and crustose lichens, seems to be very helpful. Some of the illustrations are taken from the "Lichens of Minnesota," and a few are new, but there should be more of them. Some of the fine photographs by Prof. Fink in issues of the Bryologist, in the years 1905-1910, would merit inclusion in such a work as this.

This book will be helpful to lichen students and will increase interest in the subject. But, from comparison with other work in this field, especially the European authors, and American workers on particular genera, it seems just to say that the authoritative Manual of American Lichens has yet to be issued.

Raymond H. Torrey

FIELD TRIPS OF THE CLUB

TRIP OF SEPTEMBER 8 TO BLAIRSTOWN, N. J.

Twelve members and friends of the club explored the vicinity of Cedar Lake, giving especial attention to the Pteriodphyte flora, thirty-seven species of which were found. This station of *Asplenium ebenoides* has been under observation for six seasons. It consists of only two plants which appear to do well but there has been no tendency for the numbers to increase. A number of species of fungi were observed by members interested in this group of plants; an unusually perfect specimen of *Geaster* being the reward of one collector. Among the higher plants, Coral-root, Ladies Tresses, Beech-drops, Gerardia, Hog Peanut, Lobelia, Jewelweed, and Cardinal Flower were found in very fine flowering condition. The assistance of Messrs Charles Magyar and Carrell Morris, former nature councillors at Camp Sakawawin on Cedar Lake is acknowledged with appreciation. The following ferns and ferns allies were found:

Polypodium vulgare L.; Phegopteris polypodioides Fee; P. hexagonoptera (Michx) Fee; Adiantum pedatum L.; Pteris aquilina L.; Pellaea atropurpurea (L) Ling.; Asplenium ebenoides R. R. Scott; A. platyneuron (L) Oakes; A. Trichomanes L.; A. Ruta-muraria L.; A. acrostichoides Sw.; A. Filix-femina (L) Bernh.; Camptosorus rhizophyllus (L) Link; Polystichum acrostichoides; Aspidium thelypteris (L) Sw.; A. noveboracensis (L) Sw.; A. marginale (L) Sw.; A. Goldianum Hook.; A. cristatum (L) Sw.; A. spinulosum (O. F. Miller) Sw.; A. spinulosum var. intermedium (Muhl.) D. C. Eaton; Cystopteris bulbifera (L) Bernh.; C. fragilis (L) Bernh.; Woodsia obtusa (Spreng.) Torr.; Dicksonia punctilobula (Michx.) Gray; Onoclea sensibilis L.; O. Struthiopteris (L) Hoffm.; Osmunda regalis L.; O. Claytoniana L.; O. cinnamomea L.; Botrychium obliquum Muhl.; B. obliquum var. dissectum Spreng.; B. virgianum (L) Sw.; Equisetum arvense L.; Lycopodium lucidulum (Michx.); L. clavatum L.; L. complanatum L.

JOHN A. SMALL

TRIP OF SEPTEMBER 21–22, IN THE SHAWANGUNKS

The most interesting find, on the field trip of Sept, 21–22, on Shawangunk Mountain; was *Smilacina trifolia* (*Vagnera trifolia*), in a swamp at an altitude of 1900 feet, on the ridge forming the southeastern side of the mountain, south of Lake Awosting.

The plant, with three, sometimes four oblong leaves, and with an upright raceme, is dwarf compared with our other two species of the genus, *S. racemosa* and *stellata*. It occurred with *Clintonia borealis*. There are few occurrences of this plant south of this Shawangunk station. Dr. H. D. House, New York State Botanist, records it as extending to Orange and Dutchess Counties. Norman Taylor records it in Pine Plains, Dutchess Co., N. Y.; and Morris and Sussex Counties, N. J.; (possibly in Green Pond Swamp and on Kittatinny Mountain?). He lists it as among plants forced south by the ice sheets of the last Glacial Period, and not now found south of the terminal moraine.

Another interesting plant, found along a path descending the southeastern face of the mountain, was *Pogonia verticillata*, which is not common. The colony included more than twenty plants.

Special attention was given to lichens, with the guidance of Mrs. Gladys P. Anderson. The most common crustose lichen is *Rinodina oreina*, which is everywhere on the ice-polished Shawangunk quartzite, in dainty little islands or in large colonies probably centuries old. *Gyrophora Muhlenbergii* is common, as everywhere on this mountain, in the small form, an inch in diameter or less, perhaps due to the open, waterless conditions on the ice-planed ledges or the many boulders. Other lichen genera well represented were *Lecanora*, *Lecidea*, *Rhizocarpon* and *Acarpospora*. *Cladoniae* were mostly of species resistant to the numerous fires which are set by the blueberry pickers to cause new crops; including *C. strepsilis* and *papillaria*, on the thin earth, with some *C. sqaumosa* and *verticillata*. *C. uncialis* was everywhere on thin soil, but the *Cladinae* were not common, and evidently suffer in fires.

Some fairly large Red Spruce, mixed with hemlock, persists in the steep walled depressions, in dropped fault blocks, frequent on this much broken up mountain. These conifers are absent on the open ledges, swept by fires, but are protected by the rock-walled, moist depressions. *Rhododendron*, (*Azalea*) *canescens* seems to be the prevalent species in place of *R. nudiflorum* of lower altitudes. *Pyrus* (*Sorbus*) *americana* is fairly common. *Amelanchier spicata* is common, here replacing the *A. canadensis* of lower hillsides.

Mud Pond, a shallow body of water about a third of a mile

long, near the southeastern brink, occupying another dropped block depression, looks well worth hours of study, for its rich aquatic vegetation, but time did not permit intensive search, which will be left as an objective for 1936. Two comfortable rock shelters were found, which are used by blueberry pickers in July and August and were so alluring that it was proposed to use one of them as headquarters for more intensive study of this fascinating region another summer.

Arenaria groenlandica var. *glabra*, (*Minuartia glabra* of Dr. House's list) was occasional and still in bloom. *Potentilla tridentata* occurs at Sam's Point, but was not found elsewhere on this part of Shawangunk Mountain, although it occurs near Lake Minnewaska and Lake Mohonk. The lichen *Cetraria islandica* occurs at Sam's Point and High Point, and may be elsewhere on this high plateau.

RAYMOND H. TORREY

PROCEEDINGS OF THE CLUB

Meeting of October 1, 1935

The meeting was held at the American Museum of Natural History.

Report of Council meeting was read. Mr. Raymond Torrey was appointed to represent the Club at New York State Trails Conference.

Dr. Elmer D. Merrill's resignation from the Council was accepted. Mr. James Murphy was appointed to succeed Dr. Merrill.

The following were unanimously elected to membership in the club: Mr. Paul Franz Brandwein, Biological Department, New York University, New York, N. Y.; Mr. Henry Morrell, The Players, 16 Gramercy Park, New York, N. Y.; Mr. Guy G. Nearing, E. Ridgwood Avenue and Paramus Road, Ridgewood, N. J.; Miss Mary Olmsted, 205 East 176th Street, New York, N. Y.

The resignations of Mrs. Anne H. Blinks and Mrs. L. P. Warren were accepted with regret.

The death of Professor Thomas H. MacBride in March of last year was reported.

Mr. Raymond H. Torrey reported that the requirement of membership for attendance at Torrey Club field meetings has not noticeably decreased attendance and said that the scheme is working out very well. He suggested also the use of chartered buses for use on certain excursions, but after discussion the consensus of opinion was that this was not a thing to undertake immediately.

Dr. Hagelstein told about the collecting of slime molds during the mycologists foray around Ithaca and asked that members still keep in mind the making of slime mold collections during field trips, but he also told us that, in the collections made during the foray, a number of species found on the specimens after microscopical examinations were not observed in the field. Your secretary humbly suggests that if Dr. Hagelstein requires a microscope to find the slime molds after collecting them it might be a little difficult for the average field botanist to find them at all.

Dr. Harper told of the rediscovery nearby of the fungus *Underwoodia* during the past season.

Professor Sinott of Barnard gave a very interesting account of his experiences at the International Botanical Congress and particularly emphasized the developments of Zuyder Zee from which the salt water was pumped in 1931, the land now producing good crops of a variety of plants. He also spoke of the Dutch Elm Disease and stated that the Dutch are pruning out the diseased branches of many of the defective elms and found that the Asiatic Elm, *Ulmus pumila*, is almost immuned to the disease.

Dr. Hazen reported as Delegate of the Club to the nomenclature section of the International Botanical Congress and stated that the action taken was on details of policy rather than on any broad principles.

Dr. Howe told of the Fortieth Anniversary meeting of the Vermont Botanical Club which is one of the very old clubs of this kind. He also told about the excursion which he led to Montauk Point at which time the collecting of Algae was particularly favorable, a great deal of material having been washed ashore during the previous few days.

Dr. McLean showed a specimen of climbing fern collected from a station discovered about 1860 near Freehold by the Rev. Dr. Lockwood. It was rediscovered about 1900 and not visited again until the past summer. It constitutes one of the most accessible stations for this species.

FORMAN T. MCLEAN
Secretary

MEETING OF OCTOBER 16, 1935

The meeting was held at The New York Botanical Garden and was called to order by President Hazen at 3:30 P.M.

The following were unanimously elected to membership in the Club: Dr. W. H. Camp, The New York Botanical Garden, New York, N. Y.; Mr. D. A. McLarty, Columbia University, New York, N. Y.; Mr. Jerome Metzner, 1014 Manhattan Avenue, Brooklyn, N. Y.

Dr. John H. Barnhart of The New York Botanical Garden gave an interesting talk on "New York Influences on Botanical Nomenclature."

Dr. A. B. Stout of The New York Botanical Garden gave a report of a meeting of the Canandaigua Botanical Club.

FORMAN T. MCLEAN
Secretary

NEWS NOTES

During the last week in October a forest fire burned over 2,500 acres on the lower mountain slopes north of Pasadena, California, and a somewhat larger area was burned on the Malibu Mountains near the coast north of Santa Monica. The direct loss was not great as the areas burned were mostly of shrubby growth, chaparral, but the loss in soil protection was serious. A disasterous flood in January, 1933, near Montrose, with the destruction of homes and cultivated land by boulders and other material washed down from the mountains, followed a fire similar to the present ones, but a few miles further north. In an effort to avoid a recurrence of such a flood, débris basins are being constructed at the mouths of the canyons and the burned areas are being planted with seed of black mustard. On November 4th a special ceremony was staged at the edge of the burned area in Altadena when county foresters and engineers and U. S. foresters began the sowing of 17,000 pounds of mustard seed furnished by the Forest Service. The work is being done by boys of the C.C.C. but over the Malibu burn the seed is to be sown from an airplane. Experiments have shown that mustard grows quickly after the first fall rain and affords a satisfactory temporary ground cover.

On September 2nd, at a meeting of the International Union of Biological Sciences in Amsterdam, Dr. E. D. Merrill was elected president, succeeding Dr. A. C. Seward, of the University of Cambridge.

Dr. Marshall A. Howe, Director of the New York Botanical Garden, has been made professor of Botany at Columbia University.

Dr. W. H. Camp, formerly of Ohio State University, has been appointed an assistant curator at the New York Botanical Garden to take the place of Dr. Harold N. Moldenke who is

conducting research work at Kew and other herbaria, working under a National Research Council fellowship. Dr. Camp is assisting in the instruction of the classes for Professional Gardners.

Dr. Oakes Ames, who recently resigned as Arnold professor of botany at Harvard, has been awarded the George Robert White Medal of Honor of The Massachusetts Horticultural Society for his services to horticulture over a long period of years. (*Science*)

Dr. B. E. Dahlgren, botanist of the Field Museum of Natural History left Chicago on October 8th for a three months' airplane expedition in the jungles of Brazil, searching for Carnauba palm trees. The oil from the palm nuts is used in making waxes and polishes. The expedition is being sent by the S. C. Johnson and Son Company, makers of various commercial waxes.

Dr. Rollins A. Emerson of Cornell University and Mr. J. H. Kempton of the U. S. Dep't of Agriculture have completed a survey of the system of maize culture practiced by the Maya Indians of the Yucatan Peninsula. (*Science*)

New Horticultural Garden at the Brooklyn Botanic Garden

The part of the Brooklyn Botanic Garden lying between the Brooklyn Museum and the Mt. Prospect Reservoir which for lack of funds has lain undeveloped for years is fast taking shape as a formal horticultural garden. The work which this transformation has entailed, now virtually completed with the exception of a few minor items, has been made possible through C.W.A. funds.

The new garden, which covers about three acres, has been constructed and arranged in accordance with plans drawn by Mr. Harold A. Caparn, Consulting Landscape Architect of the Brooklyn Botanic Garden.

The central feature of the new garden is a long grass panel 60 feet in width and over 400 feet long. At each end of this "long green" two columns are to be placed and between each pair of columns, a water basin. At intervals of about 80 feet on

each side of the "long green," ten pergolas—five on each side—have been erected and these have already been planted with Wistaria and other climbers. Bordering each side of the grass panel are to be plantings of perennial herbs in a strip about 12 feet wide. These flowers will furnish masses of color during the growing season, and will have for a background a "story" of shrubs, with another story in the rear of taller shrubs and trees.

A notable feature which is linked up with this new horticultural garden is the "wall garden," about 385 feet in length along the walk on the west side, leading to Eastern Parkway. A wall laid in concrete to hold up the reservoir embankment has been faced with boulders and angular stones laid in rich earth, thus affording numerous chinks and crevices in which have been planted a large variety of rock-loving plants. The result, after a season's growth, is striking. Instead of a bare rock wall, one sees tiers of a large variety of rock plants well established, each framed by its particular rocks. This wall garden averages about 6 feet high, and the visitor, as he passes along, can examine with ease the different plants—in many cases without even bending his head. Species of *Dianthus*, such as *deltoides* and *caesius*, have done particularly well here this season, also species of *Cerastium*, such as *Biebersteinii*, *Thomasii*, and *tomentosum*. Other well known rock plants growing here are *Ajuga reptans*, *Linum perenne*, *Linaria pilosa*, *Tunica saxifraga*, species of *Potentilla*, *Thymus serpyllum* and *lanuginosum*, *Armeria maritima*, *Sedum acre* and *album*, *Gypsophila repens* and *Campanula carpatica* and *rotundifolia*. This wall garden has the distinction of being one of the few wall gardens in existence in any public park in America.

The American Journal of Botany has been published for the past 22 years jointly by the Botanical Society of America and the Brooklyn Botanic Garden. A new arrangement has been made so that after the first of 1936 it will be published entirely by the Botanical Society.

At the annual meeting and dinner of the New York Academy of Sciences and Affiliated Societies held at the American Museum of Natural History on December 16 the retiring president, Dr. Marshall A. Howe, gave an illustrated address on "Plants that form reefs and islands."

At Connecticut College a plant hormone laboratory and greenhouse has been completed. The first is underground and completely air conditioned. Special provision has been made for studies on the influence of monochromatic light on phytohormones.

Professor Marie-Victorin, head of the department of botany of the University of Montreal, whose Flore Laurentienne was reviewed in our September–October issue has been awarded the Coincy Prize by the Paris Academy of Science.

The University of Pittsburgh has combined the departments of botany and zoology as the department of biology. Dr. Oscar E. Jennings, head of the department of botany has been made head of the new department. All members of both departments are retained under the new arrangement.

Preserving the Colors in Pressed Plants

Herbarium specimens, when they get dry, brittle and brown are valuable for study and scientific work, but are scarcely objects of beauty. Many attempts have been made to preserve the colors of flowers and foliage in dried plants, but without any great success. Mr. Fessenden, a member of the Torrey Botanical Club, residing in Fleetwood, has been attacking this problem from the chemical side, and has apparently bit upon a practical treatment to keep the colors in both leaves and flowers. He treats them with a chemical which arrests the normal fading of the colors, then seals them in a cellophane envelope. The result is a flat specimen, which may be studied from both sides, is flexible and easily handled without danger of breakage, and which retains its natural color for a long time, even when exposed to sunlight.

His exhibits of these at The New York Botanical Garden and at the Horticultural Society of New York have both aroused much favorable comment. Even the orchids, so difficult to keep from turning black with usual drying, retain their colors under Mr. Fessenden's treatment.

Field Trip Leaders for 1936 Wanted

The Field Committee of the Torrey Botanical Club desires to complete the schedule of field trips for 1936 somewhat earlier

than hitherto, so as to get it printed and mailed to members by April 1, 1936. The work of the committee will be aided if those who will volunteer to lead trips in 1936 will send the data; date (including alternative dates), place, objectives, transportation, etc., to the chairman, by Feb. 1. Interesting week end trips for May 30–31; July 4–5, Sept. 5–7, and Oct. 10–12, are especially desired.

Raymond H. Torrey, Chairman, Field Committee, 99–28 193rd Street, Hollis, L.I., N.Y.

Errata:

On page 120, after *leucosperma*, read "n. f." in place of n. var.

On page 120 and 123 the name Rocky Creek should be Stony Creek.

Dates of Publication of Torreya, Volume 35

January-February	March 2
March-April	April
May-June	June 26
July-August	August 30
September-October	October 14
November-December	December 31

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The names of species and varieties described as new are in **black faced type.**

THE TORREY BOTANICAL CLUB

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OTHER PUBLICATIONS

OF THE

TORREY BOTANICAL CLUB

(1) BULLETIN

A journal devoted to general botany, established in 1870 and published monthly, except during July, August, and September. Vol. 61, published in 1934, contained 546 pages of text and 32 full page plates. Price $6.00 per annum. For Europe, $6.25.

In addition to papers giving the results of research, each issue contains the INDEX TO AMERICAN BOTANICAL LITERATURE—a very comprehensive bibliography of current publications in American botany. Many workers find this an extremely valuable feature of the BULLETIN.

Of former volumes, 24–60 can be supplied separately at $6.00 each; certain numbers of other volumes are available, but the entire stock of some numbers has been reserved for the completion of sets. Single copies (75 cents) will be furnished only when not breaking complete volumes.

(2) MEMOIRS

The MEMOIRS, established 1889, are published at irregular intervals. Volumes 1–18 are now completed. Volume 17, containing Proceedings of the Semi-Centennial Anniversary of the Club, 490 pages, was issued in 1918, price $5.00.

Volume 18, no. 1, 108 pages, 1931, price $2.00. Volume 18, no. 2, 220 pages, 1932, price $4.00. Volume 18 complete, price $5.00.

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Correspondence relating to the above publications should be addressed to

MRS. R. A. HARPER
Schermerhorn Hall,
Columbia University,
New York, N.Y.